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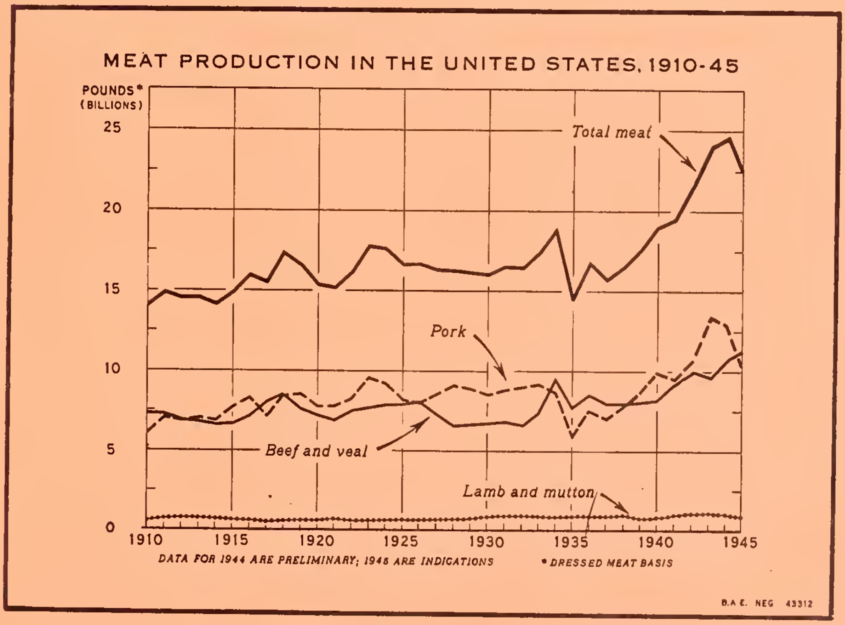
FEED GRAINS AND MEAT ANIMALS IN WAR AND PEACE



by
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WASHINGTON, D. C.
NOVEMBER 1945

FEED GRAINS AND MEAT ANIMALS IN WAR AND PEACE

By C. W. Crickman, Agricultural Economist

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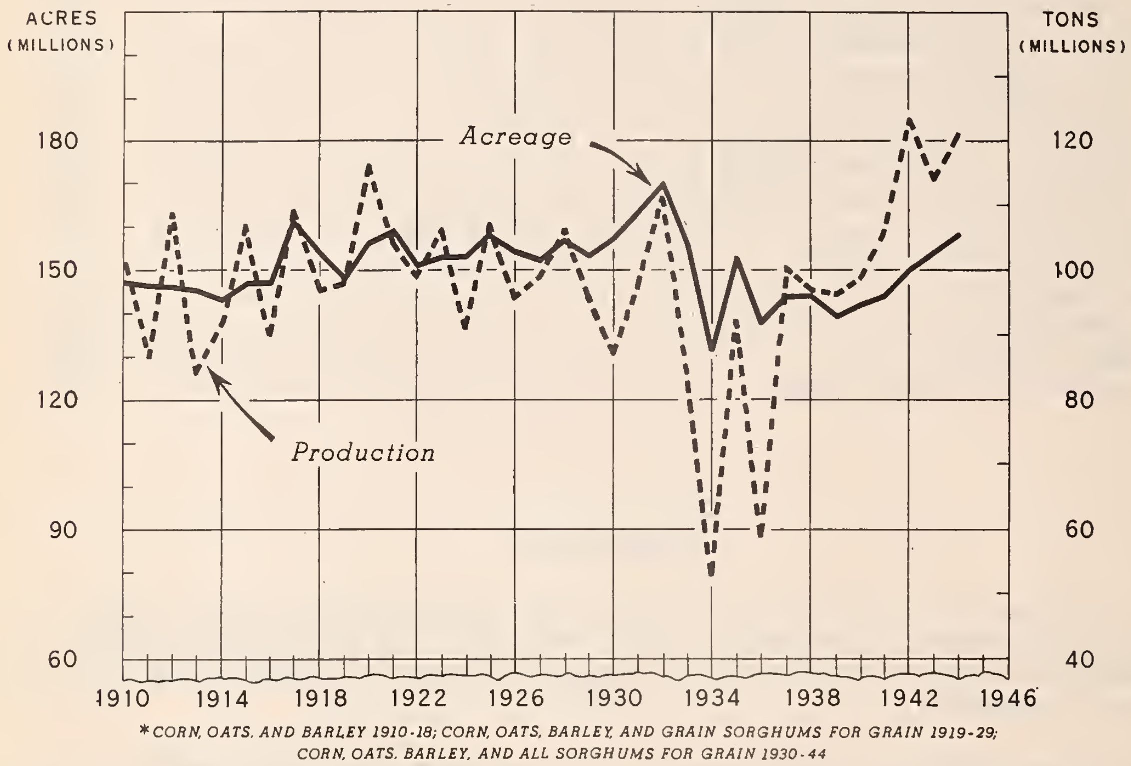
INTRODUCTION

We are on the threshold of the transition from wartime to peacetime economy. Farmers, along with others, are recalling the course of past events and conjecturing about the situation ahead, in which there are many dynamic elements.

The purpose of this report is (1) to trace the developments in production and consumption of feed grains, meat animals, and meat during the two World Wars and intervening years, and (2) to explore the circumstances which may influence the course of changes during the early postwar period. A clear understanding of the forces which have or may influence changes in the feed-grain and livestock enterprises is fundamental in the job of making advantageous postwar adjustments.

CHANGES IN FEED GRAINS SINCE 1910

The total acreage of the feed grains--corn, oats, barley, and sorghums--was approximately the same at the beginning of World War II and when World War I started in 1914. During each war period the acreage increased, but the increase in 1917 was greater than was attained during the recent war (fig. 1). There are at least two reasons for the difference in increase in this and the last war. First, 30 percent of the large acreage of winter wheat seeded in the fall of 1916 was winter-killed, thus making the land available for spring-seeded crops in 1917. Second, soybeans now are a strong competitor of feed grains for land in most of the Corn Belt, whereas during World War I, the production of soybeans was in the preliminary introduction stage.



*CORN, OATS, AND BARLEY 1910-18; CORN, OATS, BARLEY, AND GRAIN SORGHUMS FOR GRAIN 1919-29; CORN, OATS, BARLEY, AND ALL SORGHUMS FOR GRAIN 1930-44

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Figure 1.- Harvested acreage and production of feed grains in the United States, 1910-44*

Because of the tremendous wartime need for vegetable oil from soybeans--which are grown in the same areas and in the same place in the crop rotation as feed grains--the total harvested acreage of feed grains, although steadily increased between 1939 and 1944, has not exceeded the level attained before the big droughts. The acreage was considerably less in 1944 than in 1932 and somewhat less than the acreages in 1931 and 1921. The average acreage during the 5-year period, 1940-44, was 1 percent below that of the World War I period (1915-19) and 3 to 4 percent below that of each of the three successive 5-year periods from 1920 to 1934. The 1940-44 averages of the acreages of oats, barley, and sorghums compare more favorably with those for the earlier periods than do those for corn, partly because the AAA programs for 1940 and 1941 included corn-acreage allotments.

Notwithstanding the comparative acreage, the production of feed grains during World War II has averaged above any of the indicated earlier periods, including the period of World War I; and in 1942 and 1944 it was above the previous record made in 1920. The reason for a larger production on fewer acres in later years is higher acre yields for the respective feed-grain crops, as the acreage of corn--the highest yielding of the four crops--has been a smaller proportion of the total than formerly. Some of the reasons for the increases in yields per acre are discussed in the sections on individual feed grain.

Table 1.- Harvested acreage and production of feed grains in the United States, averages 1910-44, annual 1944 1/

Period	Acreage		Production	
	Average	Percentage of 1935-39	Average	Percentage of 1935-39
	1,000 acres	Percent	1,000 tons	Percent
Average				
1910-14	148,497	103	96,134	108
1915-19	155,126	108	101,797	115
1920-24	154,244	107	103,007	116
1925-29	154,980	108	100,720	113
1930-34	155,409	108	86,352	97
1935-39	143,630	100	88,846	100
1940-44	149,536	104	112,327	126
1944	157,695	110	120,972	136

1/ Corn, oats, barley, and sorghums harvested for grain. Data for sorghums for 1930-44 are for all sorghums harvested for grain; those for 1910-29 are for only grain sorghums harvested for grain, and those for 1910-18 are based on incomplete unpublished estimates.

Corn Acreage and Production

The acreage of corn in the United States expanded rather steadily after the Civil War until 1910 and then remained approximately stable until 1930 (except in 1917), at about 100 million harvested acres. The record acreage of corn was established in 1917 under the combined circumstances of World War I and an extraordinary degree of winter-killing of wheat that was seeded in the fall of 1916 (fig. 2). During the depression years of 1931,

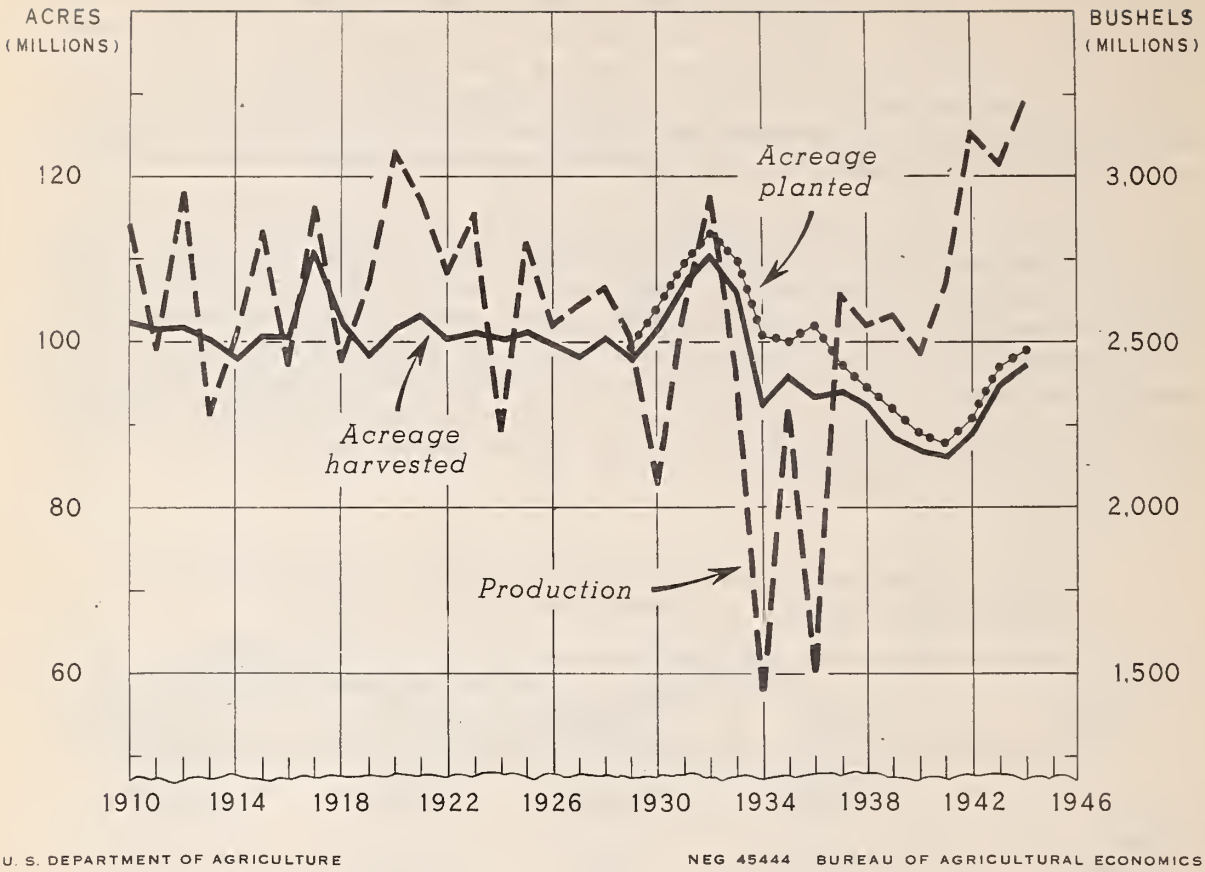

Figure 2.- Acreage and production of corn in the United States, 1910-44

1932, and 1933 farmers in many areas tried to offset low prices by increasing the acreage of corn, which is their highest yielding crop. The acreage in 1932 was near the 1917 record. The drought in 1934, followed by the corn-acreage allotment programs, which were designed to adjust the production of corn to the impaired demand for livestock products, steadily brought the acreage down to about 86 million acres in 1941, which was lower than in any year since 1894.

The first crop of corn in the United States that exceeded 3 billion bushels was harvested in 1906 from 95.6 million acres. The 3-billion mark was approached closely in 1912 and in 1917, but it was not exceeded again until 1920. During most other years between 1910 and 1930, the production ranged between 2.5 and 2.9 billion bushels, with a considerable tendency for annual alternation of good and poor crops. More than 2.9 billion bushels of corn were harvested from the near-record acreage in 1932, but in 1931 and 1933 when the acreage was higher than in any earlier years except 1917 and 1932, production was below the average for the preceding 25 years.

Droughts in 1934 and 1936 cut production relatively more than harvested acreage. Yields per acre were lower in those years than in any other year of record.

Although harvested acreage declined steadily after the drought until 1941, production returned to long-time average levels under the influence of a combination of factors favorable to the establishment of a new plane of acre yields. With progressive increases in acreage under wartime conditions, the continued expansion in the use of hybrid seed, and good growing weather, production was more than 3 billion bushels in each of the 3 years 1942-44. A new record was set in 1942 and was broken in 1944, when production was 3.2 billion bushels.

Table 2.- Harvested acreage and production of corn in the United States, averages 1910-44, annual 1944

Period	Acreage		Yield per acre		Production	
	Average	Percentage of 1935-39	Average	Percentage of 1935-39	Average	Percentage of 1935-39
	1,000 acres	Percent	Bushels	Percent	1,000 bushels	Percent
Average						
1910-14	100,623	109	26.0	104	2,614,312	113
1915-19	102,483	111	25.9	104	2,656,456	115
1920-24	101,280	109	27.2	109	2,760,953	119
1925-29	99,456	107	26.4	106	2,628,582	114
1930-34	103,404	112	21.9	88	2,286,584	99
1935-39	92,699	100	25.0	100	2,315,539	100
1940-44	90,727	98	32.0	128	2,906,469	126
1944	97,235	105	33.2	133	3,228,361	139

As it is a result of area planted multiplied by acre yield, the production of corn in the United States shows the characteristic tendencies of both. It fluctuates annually with yield, whereas the tendency toward expansion or stability was attributable more largely to area planted, until progress in the use of hybrid seed became significant in 1937. Since 1937 hybrid seed has been the most important single influence toward an expansion in production. Later increases in acreage probably must be classed mainly as recovery rather than expansion.

The greater vigor of hybrids and their resistance to lodging, plant diseases, and insects increase acre yields by about 20 percent over open-pollinated varieties. Hybrid seed had replaced open-pollinated varieties on about 58 percent of the acreage planted in 1944. Thus it is calculated that corn production in 1944 was about 400 million bushels greater than it would have been had open-pollinated seed been used on all of the acreage planted (assuming hybrid seed increases acre yield 20 percent over open-pollinated varieties).

Weather always has been the principal cause of annual fluctuations in yield. One short crop goes with two large crops, on the average, but the order of large and small acre yields is highly irregular. Occasionally, several years of high yield come in succession. This occurred during the 5 years from 1919 to 1923. It occurred again beginning in 1937 and continuing through 1944. Studies of yields of corn and the rainfall for many years indicate a close relationship between the rainfall in July and the yield.

The acre yields averaged 25.4 bushels during the 10-year period, 1923-32. During the 5-year period from 1919 to 1923 when growing weather was unusually favorable the average was 28.3 bushels. Assuming that this difference was the result of the continued unusually favorable weather, and applying it to the acreage harvested in 1944 gives an indication that the 1944 corn crop was about 282 million bushels larger that could have been expected with average growing weather.

If 1944 production was increased 400 million bushels by hybrid seed and 282 million bushels by better-than-average growing weather, the probable production in 1944 with open-pollinated seed and average weather would have been 2,546 million bushels, (3,228 million bushels actually harvested minus 682 million bushels). As the acreage in 1944 multiplied by 25.4 bushels (average yield, 1923-32) gives only 2,470 million bushels, we have an indication that improvement in cultural practices, use of fertilizer, and location of land used for growing corn may have had the net influence of increasing the acre yield in 1944 (compared with the 1923-32 average) sufficiently to increase the 1944 production about 75 million bushels.

Data are not available on the quantity of fertilizer used on corn during the period from 1923 to 1932. But it is estimated that the increase from 1935-39 to 1943 was about 65 percent and that this increase may have added the equivalent of 1 bushel to the yield of all acres of corn harvested in 1943, or a total of about 95 million bushels.

Diseases and insect enemies of corn take their toll of production. The total damage varies from year to year, but may average as much as 250 million bushels. Generally speaking, however, there were no prolonged periods of upward or downward trends in the total damage caused by diseases and insects preceding the use of hybrid seed. It is known that a part of the increased yield of hybrid seed has been due to lowering the damage caused by some insects and diseases through its greater resistance, but conclusive data are not available for measuring the extent of this effect.

Regional Trends.- Before the drought in 1934, the acreage of corn was shifting North and West into Minnesota, Wisconsin, and the northern Plains States. From 1910-14 to 1925-29 the average proportion of the United States acreage harvested in the Corn Belt declined from 35.8 percent to 34.6 percent, and in the Appalachian States from 12.4 percent to 10.7 percent; whereas the proportion harvested in the Lake States increased from 6.0 to 7.8 percent, and in the northern Plains States from 17.9 percent to 21.7 percent (table 3).

Table 3.- Corn: Percentage distribution of acreage and production in the United States, by regions, averages 1910-44, annual 1944

Period	Corn Belt 1/	Lake States 2/	Northern Plains 3/	Southern Plains 4/	Appalachian 5/	Southeast 6/	Mississippi Delta 7/	Other 8/
	Acreage							
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Average								
1910-14	35.8	6.0	17.9	9.6	12.4	8.4	6.3	3.6
1915-19	35.2	6.5	17.2	7.8	12.6	9.9	6.7	4.1
1920-24	34.0	7.9	18.3	7.8	11.4	9.6	6.3	4.7
1925-29	34.6	7.8	21.7	6.9	10.7	8.4	5.2	4.7
1930-34	33.2	8.3	20.7	7.8	10.5	9.2	5.8	4.5
1935-39	33.8	9.1	15.6	7.1	11.2	11.2	7.3	4.7
1940-44	33.0	9.9	16.4	7.7	11.2	10.3	7.0	4.5
1944	34.4	10.7	18.3	7.0	10.5	9.0	6.0	4.1
	Production							
Average								
1910-14	48.6	7.8	13.7	5.9	10.7	4.4	4.2	4.7
1915-19	46.9	7.6	14.3	5.1	11.8	5.1	4.0	5.2
1920-24	44.6	9.5	17.5	5.2	9.8	4.5	3.8	5.1
1925-29	46.9	9.6	17.9	4.7	9.1	3.9	3.2	4.7
1930-34	46.8	10.7	14.7	4.8	9.8	4.5	3.6	5.1
1935-39	50.9	12.2	7.2	4.6	10.3	5.2	4.4	5.2
1940-44	48.9	12.6	13.8	3.9	8.8	4.2	3.6	4.2
1944	46.2	13.2	19.2	3.2	7.6	3.7	2.9	4.0

1/ Ohio, Ind., Ill., Iowa, and Mo.
2/ Mich., Wis., and Minn.
3/ N. Dak., S. Dak., Nebr., and Kans.
4/ Tex., and Okla.
5/ Tenn., Ky., N. C., Va., W. Va., Md., and Del.
6/ Ala., Ga., Fla., and S. C.
7/ Ark., La., and Miss.
8/ Includes: Northeast--Pa., N. Y., N. J., and New England; Mountain--Mont., Wyo., Colo., Ariz., N. Mex., Utah, Idaho, and Nev. and Pacific--Wash., Oreg., and Calif.

In the 5 years from 1935 through 1939, which included the 1936 drought and the AAA corn allotment programs, the earlier upward trend in the average proportion of the total acreage that was harvested in the northern Plains States was reversed, and declined to 15.6 percent. The proportion in the Lake States continued upward and that in the Corn Belt continued downward. The proportion in the eastern and southern States increased because the acreage there was affected little by the drought and the AAA programs.

Distribution of the acreage among the regions was about the same in 1944 as in 1925-29 except that the proportion in the Lake States had continued to increase steadily and the recovery in the northern Plains States was not complete.

The general picture of the distribution of production has been very much like that of acreage, except that since 1935 the proportion of the production in the Corn Belt and Lake States has been relatively high because the influence of hybrid seed and favorable weather has centered in those regions (fig. 3). Unusually favorable weather in 1944 in the northern Plains States brought production back almost to the record of 626 million bushels produced in 1927, when the acreage was almost 20 percent larger than in 1944.

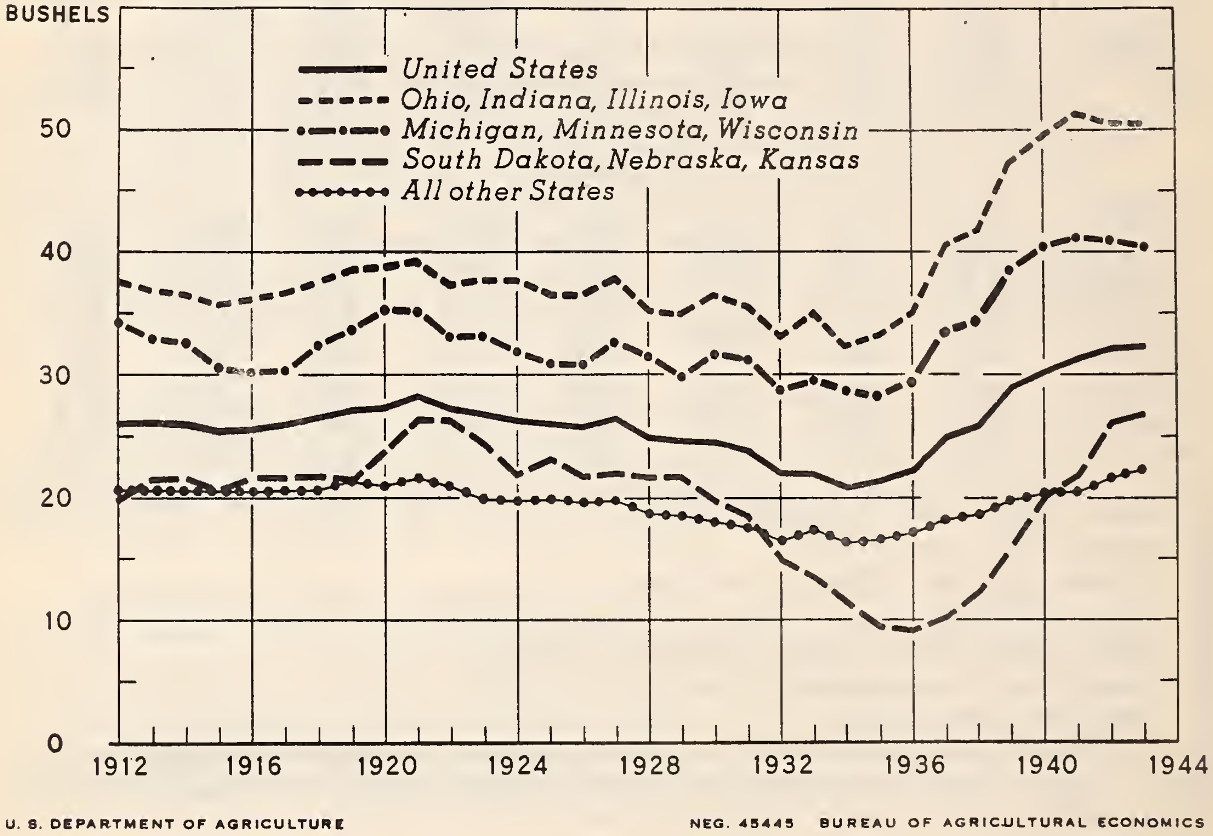

Figure 3.- Corn yields per harvested acre, by groups of States, United States, 1910-45
(5-year moving average centered on year shown)

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Situation in Principal States.- Approximately 60 percent of the acreage and 75 percent of the production of corn is in the 5 central Corn Belt States; in the 3 Lake States; and in South Dakota, Nebraska, and Kansas. These 11 States may be placed in 3 groups according to the characteristics of the trend of production in each State (fig. 4). In Minnesota, Wisconsin, Iowa, and Nebraska the trend has been distinctly upward since 1900 except in the drought years. Before 1930 South Dakota was in this group, but acreage and production in this State has not yet recovered entirely from a series of bad years between 1930 and 1941. In Illinois, Indiana, Ohio, and Michigan, the general trend in acreage has been downward, with a tendency since the drought for a reversal of this trend in production under the influence of widespread use of hybrid seed. In Missouri and Kansas the trend has been distinctly downward for many years.

Oats Acreage and Production

The oat crop of the United States ranks second to the corn crop in importance among the four feed grains. It ranks closer in acreage and tonnage of feed produced, however, than it does in value of production. But oats usually are not considered a cash crop. They are grown mainly to complete the rotation system as a transitional crop between corn and wheat or corn and grass. No other crop fits into the rotations so well nor utilizes so well the land and labor that might otherwise be unproductive. In some sections, soybeans or barley may be substituted with good results, but under most conditions these crops have certain disadvantages. Oats make a more satisfactory nurse crop for grass, clover, and alfalfa than some of the other small grains. As a feed for horses, dairy cows, breeding stock, and young animals, they are unsurpassed because of their balanced nutritive value.

The use of the tractor, motor truck, and automobile has greatly decreased the demand for oats as a horse feed. However, that portion of the crop formerly consumed by horses now is being fed, at least in part, to dairy cows, young stock, and poultry.

The acreage in the United States increased rapidly and rather consistently from the time annual estimates became available in 1866 until 1921 when a record of 45.5 million acres was harvested (fig. 5). After 1921 the general trend in acreage was significantly downward until 1939. Since then, an increase of 5.5 million acres has been recorded, but the acreage harvested in 1944 was still almost 6.6 million acres below the 1921 record harvested acreage.

During World War I and the immediately succeeding years (1914 to 1921) the acreage of oats increased steadily, except in 1919 when the price of wheat was guaranteed in a continuation of some wartime measures. The total increase during that period was 8.3 million acres. From 1929 through 1932 the acreage of oats moved upward with the acreage of corn, but the advance was much less significant. Most of the increase in the acreage of oats during the present war occurred before 1942, while

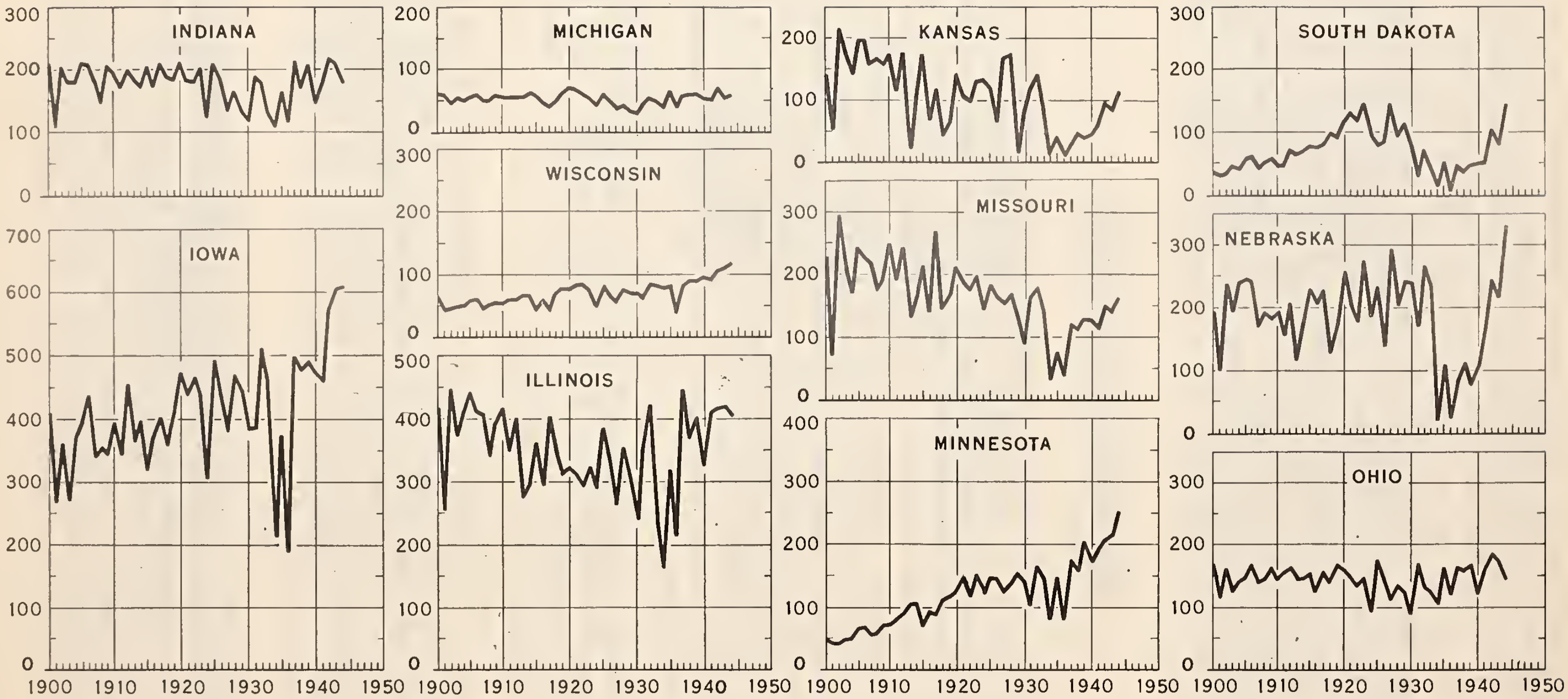

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Figure 4.- Production of corn in selected States, in millions of bushels, 1900-44

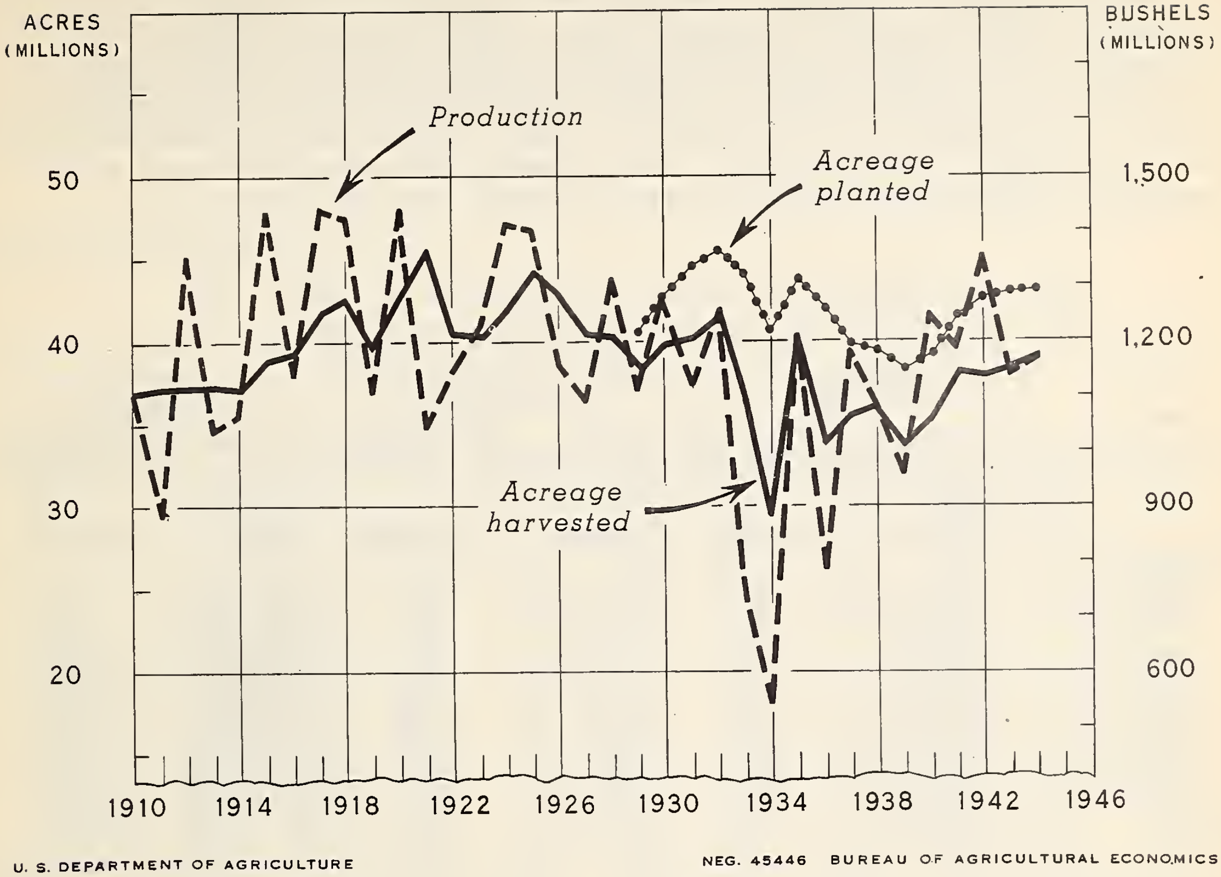

Figure 5.- Acreage and production of oats in the United States, 1910-44

corn-acreage allotments were still in effect. During the war period before 1942, the moderate increases in acreage of soybeans were obtained largely at the expense of corn. In 1942 and 1943 when the acreage of both corn and soybeans increased considerably, the acreage of oats increased only slightly. In 1944 the acreage of barley and soybeans decreased and the acreage of oats increased moderately. Compared with the period of World War I, the average acreage of oats during 1940 to 1944 was 7 percent less, whereas the average acreage of corn was 13 percent less.

The production of oats is characterized by wide year-to-year fluctuations (fig. 5). Two bumper crops have occurred in successive years only twice since 1910. Two of those crops were in 1917 and 1918, and the other two were in 1924 and 1925. Other years in which the crop exceeded 1.4 billion bushels were 1915 and 1920. A record crop of 1,444 million bushels was harvested in 1920. The crop in 1942 was close to the 1920 record because of the near-record yield of 35.6 bushels.

Although acre yields from 1940 through 1944 ranged from 29.6 to 35.6 bushels, which makes this period the longest one of successive high yields on record, production averaged less than during the period of World War I, because the acreage was larger then (table 4). Acre yields from 1915 through 1918 ranged from 29.1 to 37 bushels. Thus even though the average acreage of oats during the present war was nearer than that of corn to their respective World War I levels, the average production of oats was 8 percent less compared with 9 percent more for corn.

Table 4.- Harvested acreage and production of oats in the United States, averages 1910-44, annual 1944

Period	Acreage: Average	Acreage: Percentage of 1935-39	Yield per acre: Average	Yield per acre: Percentage of 1935-39	Production: Average	Production: Percentage of 1935-39
	1,000 acres	Percent	Bushels	Percent	1,000 bushels	Percent
Average						
1910-14	37,139	104	29.3	101	1,090,084	104
1915-19	40,314	113	32.5	112	1,310,394	125
1920-24	42,139	118	29.9	103	1,256,154	120
1925-29	41,145	115	29.5	101	1,215,453	116
1930-34	37,545	105	25.8	89	986,793	94
1935-39	35,761	100	29.1	100	1,045,329	100
1940-44	37,711	105	32.3	111	1,215,899	116
1944	38,984	109	29.9	103	1,166,392	112

Improvements have been made in oats seed comparable to hybrid corn, but the improved varieties of oats have not been so generally used. Variety improvement, however, has decidedly reduced the loss caused by stem rust and crown rust. In recent years new varieties, such as Tama, Boone, Vicland, and Marion have contributed to the relatively high yields and have reduced abandonment. Better winter varieties for the South have helped to expand both acreage and acre yield in that region. Expanded use of fertilizer on oats also has been noteworthy in recent years. It is estimated that the fertilizer used on oats in 1944 was 237 percent of the average quantity used from 1935 to 1939. This additional fertilizer is estimated to have added 3 percent to the yield in 1944.

Regional Trends.- The acreage of oats is shifting both North and South. The proportion of the total acreage in the Lake States and the southern Plains States has increased rather consistently since 1910 (table 5). On the other hand, the proportion in the Northeast and Appalachian States has decreased. Between 1910 and about 1929, the proportion of the total acreage grown in the Southeast, Mississippi Delta, Mountain, and Pacific States decreased, but it has increased rather steadily since. The northern Plains States grew about 20 percent of the total acreage until the drought years. During the late twenties and early thirties the proportion of the acreage grown in the central Corn Belt increased from about 37 percent to 40 percent. Since soybeans have become a major competitor with oats in the Corn Belt, the proportion of the acreage grown there has decreased considerably. In 1944 only 31 percent of the acreage of oats was in the central Corn Belt States. On the other hand, the proportion in the northern Plains States had increased to 22.5 percent in 1944.

The trends in the regional pattern of production are similar to those of acreage (table 5).

Table 5.- Oats: Percentage distribution of acreage and production in the United States, by regions, averages 1910-44, annual 1944

Acreage

Period	Corn Belt	Lake States	Northern Plains	Southern Plains	Appalachian	Southeast	Mississippi Delta	Northeast	Mountain	Pacific
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Average										
1910-14	37.9	17.9	20.9	4.5	2.7	2.6	0.9	7.1	3.4	2.1
1915-19	36.8	17.9	21.4	6.9	2.5	2.4	1.0	6.4	3.1	1.6
1920-24	36.6	19.6	21.4	7.0	2.4	2.2	0.8	5.8	2.8	1.4
1925-29	39.6	20.4	20.6	6.1	2.1	1.8	0.4	5.3	2.4	1.3
1930-34	40.0	21.5	17.5	7.4	2.1	2.2	0.5	5.4	2.0	1.4
1935-39	37.7	22.2	17.3	8.1	1.7	2.8	1.0	5.4	2.1	1.7
1940-44	34.3	21.4	20.7	7.1	1.9	3.5	1.8	4.9	2.7	1.7
1944	30.9	22.1	22.5	7.7	1.9	3.6	2.3	4.7	2.6	1.7
					Production					
Average										
1910-14	42.1	18.7	17.4	3.9	1.6	1.6	0.6	7.5	4.1	2.5
1915-19	42.6	19.7	18.3	5.2	1.4	1.3	0.6	6.3	2.9	1.7
1920-24	39.9	22.2	19.2	5.2	1.5	1.4	0.5	5.8	2.7	1.6
1925-29	42.9	23.1	17.1	4.7	1.3	1.2	0.3	5.5	2.4	1.5
1930-34	41.8	24.0	14.3	6.5	1.5	1.7	0.4	6.0	2.0	1.8
1935-39	41.7	24.6	13.9	6.2	1.2	2.0	0.9	5.4	2.1	2.0
1940-44	36.7	24.8	18.8	4.8	1.4	2.3	1.7	4.7	2.9	1.9
1944	29.6	27.4	20.4	5.7	1.7	2.8	2.5	4.8	3.1	2.0

Situation in Principal States.- The production of oats tends to be concentrated in the 5 central Corn Belt States, the 3 Lake States, and in North Dakota, South Dakota, and Kansas. The acreage was reasonably steady from 1910 through 1932 in Illinois, Indiana, Wisconsin, Michigan, and Nebraska, with some tendency to increase in Indiana and Wisconsin (fig. 6). During the same period there was a marked upward trend in Iowa, Minnesota, South Dakota, and Missouri, which continued in Minnesota, South Dakota, and

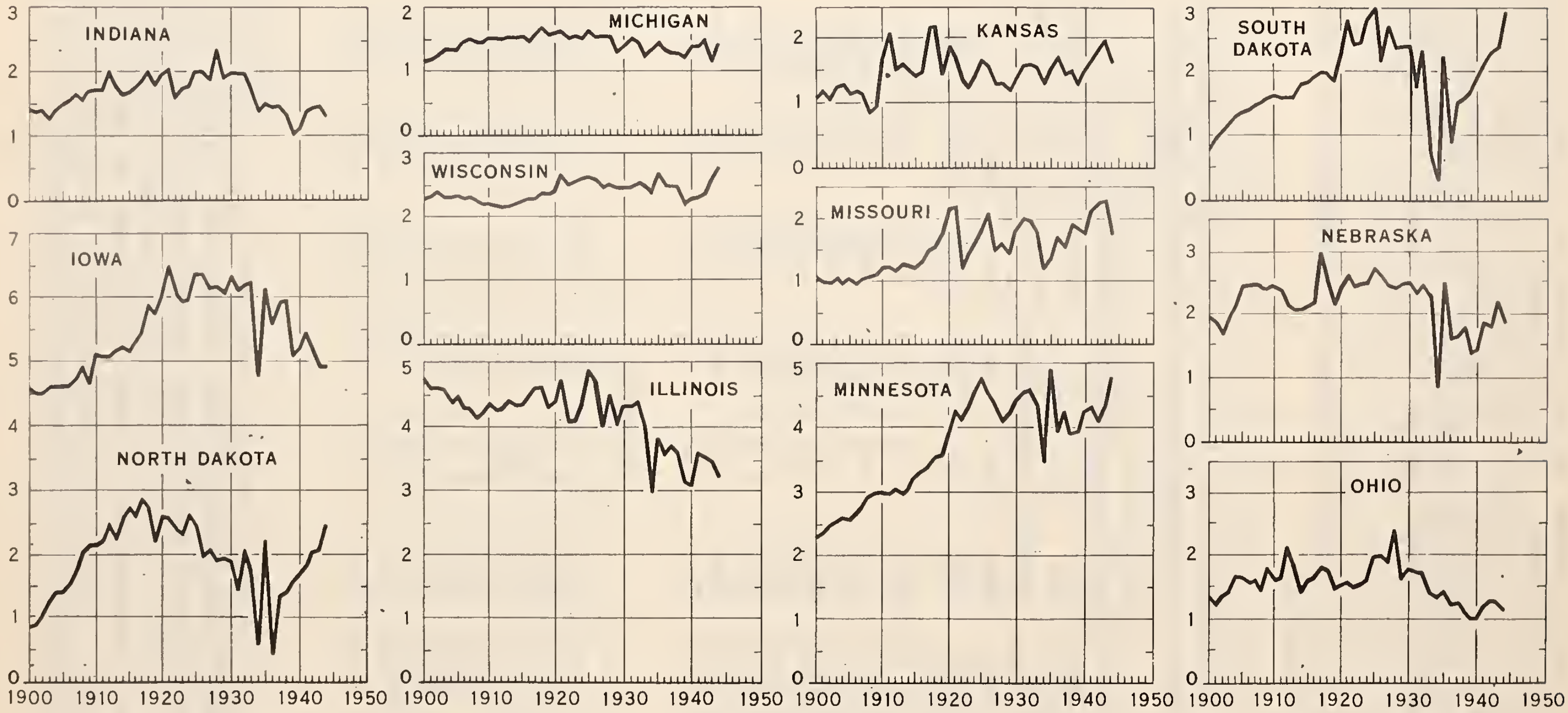

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Figure 6.- Acreage of oats harvested in selected States, in millions of acres, 1900-44

Missouri after the drought. In Iowa, Illinois, Indiana, and Ohio where soybeans have competed with oats in recent years, the acreage of oats has decreased substantially since 1932. In North Dakota acreage reached a peak in 1917 after which it declined rather steadily, even before the 1934 drought. Acreages of oats and flaxseed generally have opposite trends in North Dakota but acreages of both have increased since 1940.

In general, trends in production have been similar to those in acreage but violent annual fluctuations in yield often distort longer-time tendencies and make them difficult to measure.

Barley Acreage and Production

The acreage of barley increased uniformly from 1866 until 1910, when it reached more than 7.5 million acres. From 1910 to 1926 it remained about stationary except for moderate increases in 1917 and 1918 (fig. 7). During the 3 years from 1927 through 1929 it increased sharply to 13.6 million acres. This increase was fostered by relatively high prices for barley growing out of a combination of small domestic stocks of corn and oats and an increased foreign demand to meet an unusual shortage of feed grains in Europe. This high level of acreage was approximately maintained until drought cut acreage back to about the 1926 level.

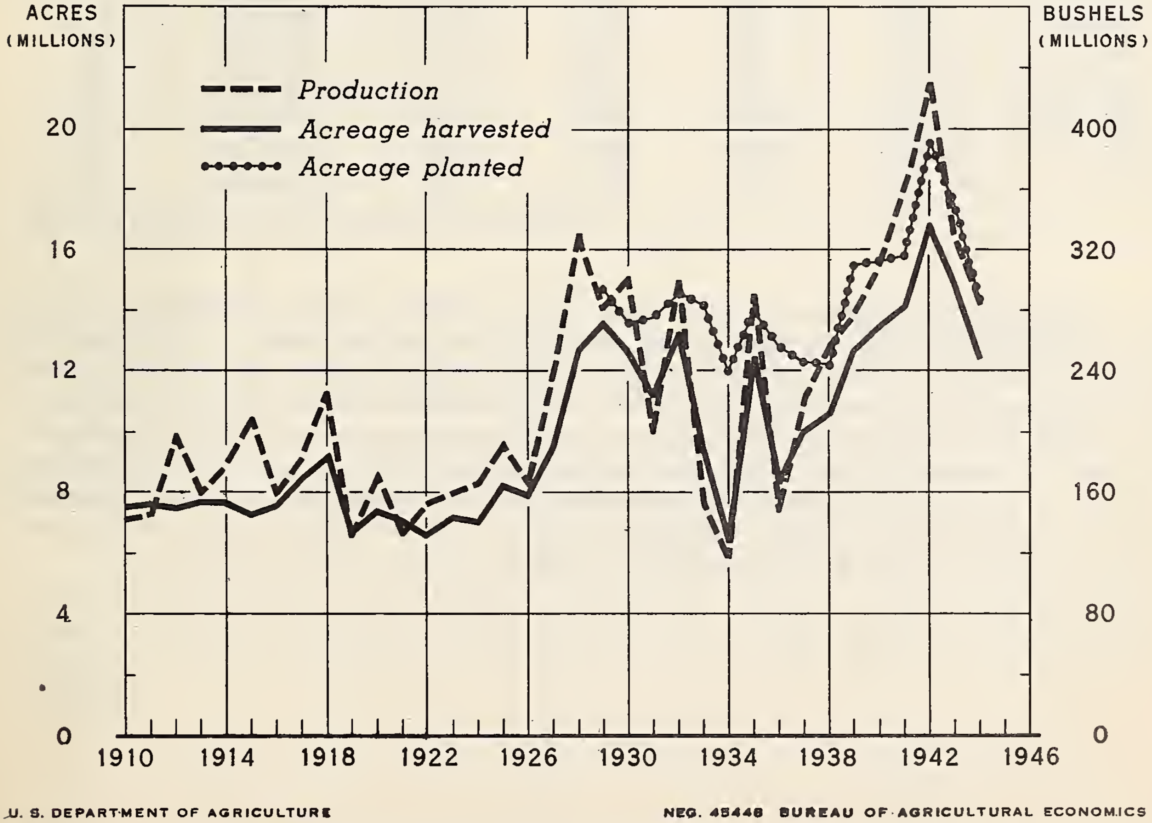


Figure 7.- Acreage and production of barley in the United States, 1910-44

During the period of expansion before the drought many more farmers had learned that barley was a good feed and that, in many areas, it produced more feed per acre than corn or oats. Consequently when acreage allotments were placed on wheat and corn the acreage of barley recovered and went to new heights between 1936 and 1942. The record acreage of 16.8 million was harvested in 1942. Since 1942 unfavorable weather at seeding time and the removal of allotments on other crops have caused some decline in the acreage.

Annual fluctuations in acre yields of barley are less than those for either corn or oats. Hence changes in production generally have been approximately proportional to changes in acreage.

Table 6.- Harvested acreage and production of barley in the United States, averages 1910-44, annual 1944

Period	Acreage		Yield per acre		Production	
	Average	Percentage of 1935-39	Average	Percentage of 1935-39	Average	Percentage of 1935-39
	1,000 acres	Percent	Bushels	Percent	1,000 bushels	Percent
Average						
1910-14	7,605	70	21.6	99	164,190	69
1915-19	7,826	72	23.1	106	180,899	76
1920-24	7,061	65	22.1	101	156,193	65
1925-29	10,373	96	23.3	107	241,311	101
1930-34	10,647	98	19.6	90	214,304	90
1935-39	10,816	100	21.8	100	238,616	100
1940-44	14,335	133	23.8	109	341,754	143
1944	12,359	114	23.0	106	284,426	119

Regional Trends.- The northern Plains States, the Lake States, and California are the principal areas in which barley is grown. Before about 1938 the northern Plains States and the Lake States grew about 40 percent and 25 percent, respectively, of the total acreage (table 7). Since then, the proportion in the northern Plains has increased to almost 50 percent whereas in the Lake States it has decreased to about 15 percent. Improved varieties of corn and oats for Minnesota and Wisconsin are crowding barley out as a feed crop, whereas barley is still a more certain crop than corn in many parts of the northern Plains States.

Table 7.- Barley: Percentage distribution of acreage and production in the United States, by regions, averages 1910-44, annual 1944

Period	Corn Belt	Lake States	Northern Plains	Southern Plains	Appalachian	Northeast	Mountain	Pacific	Other 1/
	Acreage								
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Average									
1910-14	6.9	29.2	37.7	0.4	0.3	1.5	4.5	19.5	---
1915-19	7.3	25.6	41.6	0.9	0.3	2.1	5.2	17.0	---
1920-24	6.6	22.4	42.5	3.7	0.5	2.2	6.6	15.5	---
1925-29	10.4	23.6	41.3	2.5	0.5	2.2	8.7	10.8	---
1930-34	8.8	26.5	39.3	2.5	1.2	2.2	7.9	11.6	---
1935-39	6.9	28.7	36.5	3.2	1.7	2.1	8.1	12.7	0.1
1940-44	3.9	14.4	47.4	5.1	2.7	1.8	11.9	12.5	0.3
1944	1.9	8.5	48.5	4.8	3.1	1.7	16.0	15.1	0.4
	Production								
Average									
1910-14	8.2	31.5	28.9	0.3	0.3	1.8	6.0	23.0	---
1915-19	8.8	29.3	33.4	0.8	0.3	2.4	5.6	19.4	---
1920-24	8.0	24.9	36.1	2.7	0.5	2.5	6.8	18.5	---
1925-29	13.0	27.4	33.5	1.8	0.5	2.4	8.5	12.9	---
1930-34	10.0	29.6	30.4	2.0	1.3	2.8	8.6	15.3	---
1935-39	7.6	32.3	27.4	2.3	1.8	2.6	9.7	16.2	0.1
1940-44	4.1	16.7	40.3	3.9	2.7	2.0	14.6	15.5	0.2
1944	1.9	8.0	38.9	5.2	3.4	1.9	20.7	19.6	0.4

1/ Southeast and Mississippi Delta.

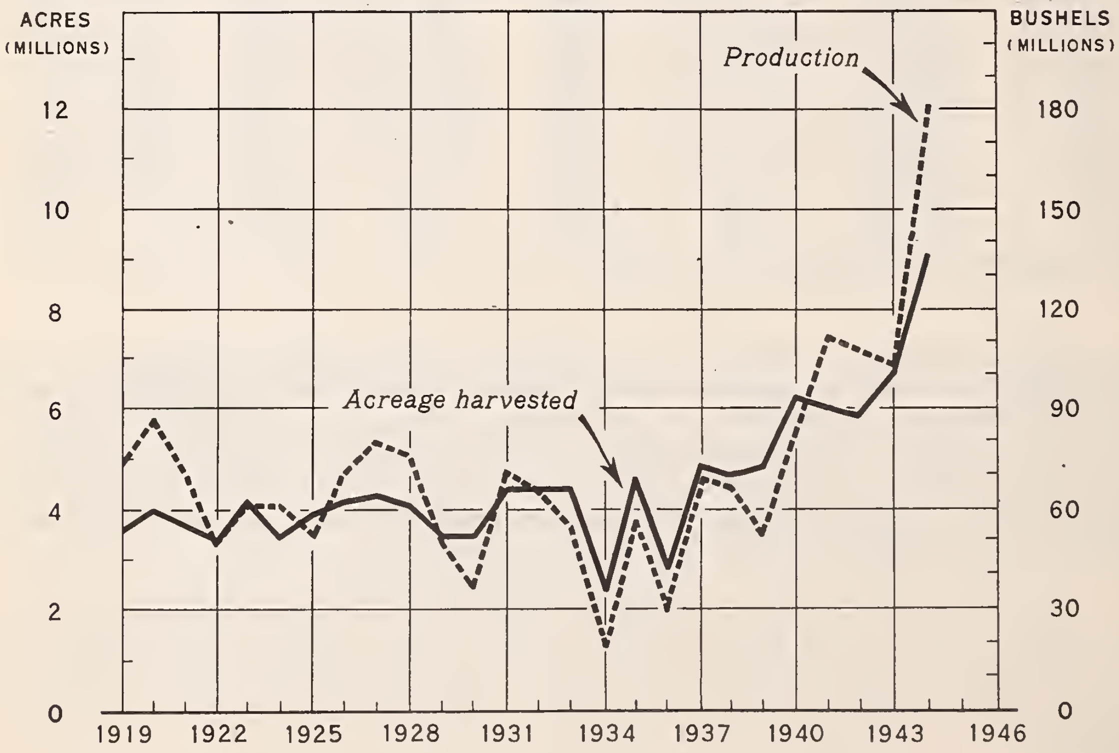
Production in California, Oregon, and Washington declined from about 20 percent to about 10 percent of the total between 1910 and 1926. After that the acreage increased in those States, but not so rapidly as in the northern Plains. Since 1938, production has expanded rapidly in the Mountain States and in the southern Plains because of the call for additional feed grains. During this period improved winter varieties of barley have stimulated production in the Appalachian States.

Although the acreage in the Corn Belt exceeded 1 million acres from 1927 to 1933, and was more than 1.8 million in 1928, barley never has been a popular crop there unless prospective returns were clearly greater than could be obtained from a crop more easily handled and less subject to disease.

Sorghums Acreage and Production

In comparison with the other feed grains, the sorghums harvested for grain are a minor crop in the United States. They are of outstanding importance, however, in the southern part of the Great Plains region, comprising portions of Kansas, Oklahoma, Texas, and New Mexico. In this area they take the place occupied by corn in the more humid parts of the country, and they provide much of the feed grain and roughage for farm and range livestock.

Complete annual statistics on sorghums for grain in the United States are not available for the years before 1919. Between 1919 and 1939 the acreage averaged about 4 million acres. Because the crop is grown under very hazardous weather conditions, production has ranged from about 37 to 88 million bushels, except in 1934 and 1936. It dropped to 19.2 million bushels in 1934 (fig. 8 and table 8). Since 1939 the increase in acreage and production has been rapid and fairly consistent. About 182 million bushels were harvested from 9.1 million acres in 1944. Development of new and higher-yielding varieties adapted to harvesting with a combine, and the exceptionally favorable opportunities for marketing feed crops through livestock brought rapid increases in recent years.



* 1919-28 ONLY GRAIN SORGHUMS FOR GRAIN

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Figure 8.- Acreage and production of sorghums for grain in the United States, 1919-44*

Table 8.- Acreage and production of sorghums harvested for grain in the United States, averages 1920-44, annual 1944 1/

Period	Acreage		Yield per acre		Production	
	Average	Percentage of 1935-39	Average	Percentage of 1935-39	Average	Percentage of 1935-39
	1,000 acres	Percent	Bushels	Percent	1,000 bushels	Percent
Average						
1920-24	3,764	86	17.6	140	66,187	119
1925-29	4,005	92	16.7	133	67,168	121
1930-34	3,814	88	12.5	99	49,833	90
1935-39	4,353	100	12.6	100	55,661	100
1940-44	6,763	155	17.2	137	117,468	211
1944	9,117	209	19.9	158	181,756	327

1/ Data for 1930-44 are for all sorghums for grain; those for 1920-29 are for only grain sorghums for grain.

Regional Trends.- Although the absolute increase in acreage has been greatest in the southern Plains States because about 65 percent of the total acreage is grown there, the average distribution of the crop in 1940-44 was about the same as in earlier years (table 9). During 1940-44 about 26 percent of the acreage was in the Northern Plains, about 7 percent in the Mountain States, and 2 percent in the Pacific States.

Table 9.- Sorghums for grain: Percentage distribution of acreage and production in the United States, by regions, averages 1920-44, annual 1944 1/

Period	Southern Plains	Northern Plains	Mountain	Pacific	Other 2/
	Acreage				
	Percent	Percent	Percent	Percent	Percent
Average					
1920-24	64.6	25.9	6.5	2.2	0.8
1925-29	67.3	24.4	5.3	2.1	0.9
1930-34	70.2	20.9	5.0	2.4	1.5
1935-39	65.4	22.4	7.4	2.8	2.0
1940-44	63.7	26.2	6.8	2.1	1.2
1944	65.8	24.1	7.8	1.2	1.1
	Production				
Average					
1920-24	63.4	25.6	6.8	3.5	0.7
1925-29	66.7	23.9	5.2	3.4	0.8
1930-34	67.3	19.8	5.8	5.7	1.4
1935-39	66.7	16.7	6.6	7.6	2.4
1940-44	62.6	25.4	6.3	4.4	1.3
1944	60.3	29.6	6.9	2.2	1.0

1/ Data for 1930-44 are for all sorghums for grain; those for 1920-29 are for only grain sorghums for grain.

2/ Corn Belt and Mississippi Delta.

WARTIME CHANGES IN FEED GRAINS

The total acreage of feed grains in 1944 was smaller than in World War I and several prewar years, but it was about as large as could be hoped for in the World War II production program. After close scrutiny of farmers' achievements in 1944, the committees on Federal and State production goals established acreage goals for 1945 which were only three-tenths of a percent larger than the combined acreage of the four feed grains in 1944. There were several reasons. First, about all the slack in the readily tillable land was taken up between 1941 and 1944, and labor and materials could not be spared for slow and arduous preparation of new land for cultivation. Second, a certain approximate balance must be maintained among different groups of crops to insure both an efficient diet and an efficient utilization of farmers' production resources. Third, soybeans were more important as a wartime crop than they were in earlier years, and they are grown in the principal feed-grain areas and in the same place in the crop rotation as those grains.

Production of feed grains during World War II exceeded any previous record even though the acreage was smaller. This is attributable to advancement in the use of recent technological developments and to unusually favorable weather. These technological developments, among which hybrid corn seed is outstanding, have increased the normal expectancy of acre yields. The limits to this rapid elevation of expectancy have not been reached, but there would have been hindrances to its continuation during additional war years at anything like the recent rate. The use of hybrid corn has about covered the principal corn-producing areas. The fertilizer, insecticides, and new machines necessary to further improvement in cultural practices would likely have been inadequate. Moreover, fertility stored in the soil during the prewar years was gradually being exhausted by continuous cropping with large acreages of the crops which deplete the soil the most.

The average production was about 10.5 million tons more during World War II (1940-44) than during 1915-19. It was larger in all groups of States except the Northeastern, Appalachian, and Southeastern. The total decrease in the East was about 2.5 million tons--mostly in the Northeastern and Appalachian States. Of the total increase in the other groups of States (13 million tons), about 41 percent was in the Lake States, 23 percent in the Corn Belt, 20 percent in the northern Plains, 9 percent in the Mountain States, 4 percent in the Pacific States, and 1.5 percent each in the southern Plains and Mississippi Delta States. Production of both corn and oats was larger in the Lake States, corn was larger but oats was smaller in the Corn Belt, and neither corn nor oats changed much but barley production was considerably larger in the northern Plains, Mountain, and Pacific States in 1940-44. In the country as a whole, corn production constituted 73 percent of the total in each war period, oats production dropped from 21 percent in 1915-19 to 17 percent in 1940-44, but barley and sorghums increased from 4 percent to 7 percent and from 2 percent to 3 percent, respectively.

CHANGES IN MEAT ANIMALS SINCE 1910

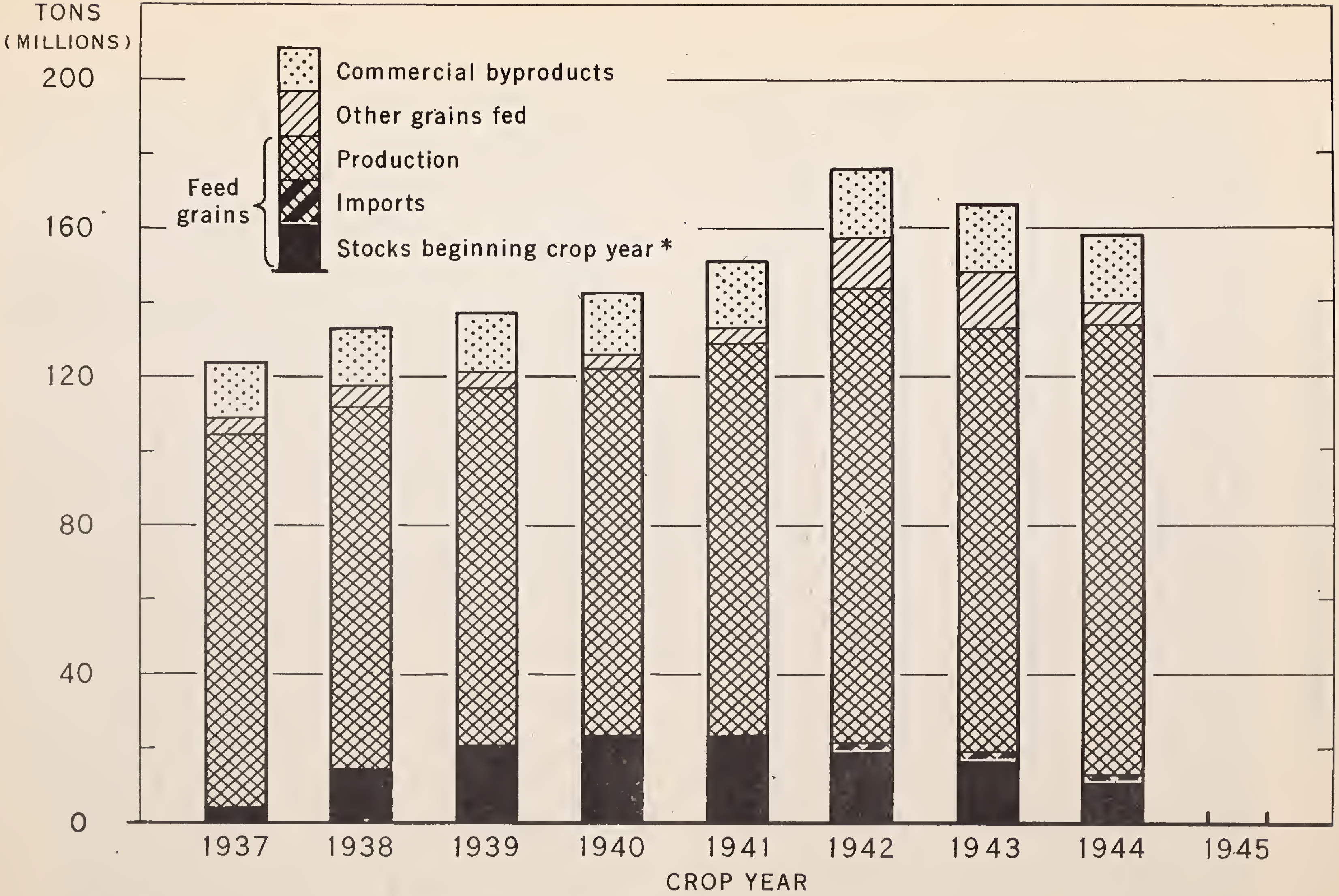
The combined production of all livestock and poultry products has increased even more than the production of feed grains and hay during World War II. Compared with an increase in feed-crop production of 24 percent, production of all livestock products in 1943 was 39 percent above the 1935-39 average. During this period the increase in the production of hogs was 89 percent, eggs 49 percent, milk 14 percent; and the number of cattle on farms January 1, 1944 was 23 percent higher than the average on January 1, 1935-39. These large increases in production of livestock and poultry were made possible partly by record crops of feed grains in 1942 and 1943 and partly by the large reserves of corn and feed wheat accumulated before 1942, as indicated by the breakdown of annual supplies of feed concentrates according to source in figure 9.

The index of production of livestock products shown in figure 10 is based upon the total weight of all meats including poultry, lard, and eggs, and the dry weight equivalent of milk. An upward trend was fairly rapid from 1910 through 1924, was less rapid after 1924 through 1933, but was tremendously rapid after 1935 during recovery from the drought and the meeting of wartime requirements. The drought of 1934 set back production of livestock and poultry products 18 percent.

Total Feed Consumption

About 85 percent of the annual production of feed grains, and essentially all of the hay and pasture produced, is consumed by livestock, including horses and mules, and by poultry. In addition, they consume considerable quantities of wheat, rye, legume seeds, cottonseed, commercial byproducts, and roughages other than hay. Generally, feed crops are fed within 12 months after harvest, although small reserves, particularly of corn and hay, are often accumulated in years of bumper crops and fed within the next year or two. The most notable instance of the building up of reserves of corn over several years was the ever-normal granary that was accumulated from 1937 through 1940 and was fed in 1942, 1943, and 1944.

Records are far from complete on the quantities of all kinds of feeds consumed annually by livestock. This is especially true of roughages other than hay and some kinds of byproduct feeds. It is possible, however, to develop indexes which measure fairly well the relative quantities of grains, byproducts, hay and pasture consumed by livestock--except in periods of great scarcity of feeds, when unusually large quantities of roughages other than hay are fed. These classes of feed are combined into an index of total concentrates, total roughage, or total of all feeds, by converting each kind of feed into feed units (which are the equivalent of a pound of corn).



*BARLEY, JUNE 1; OATS, JULY 1; AND CORN, OCTOBER 1

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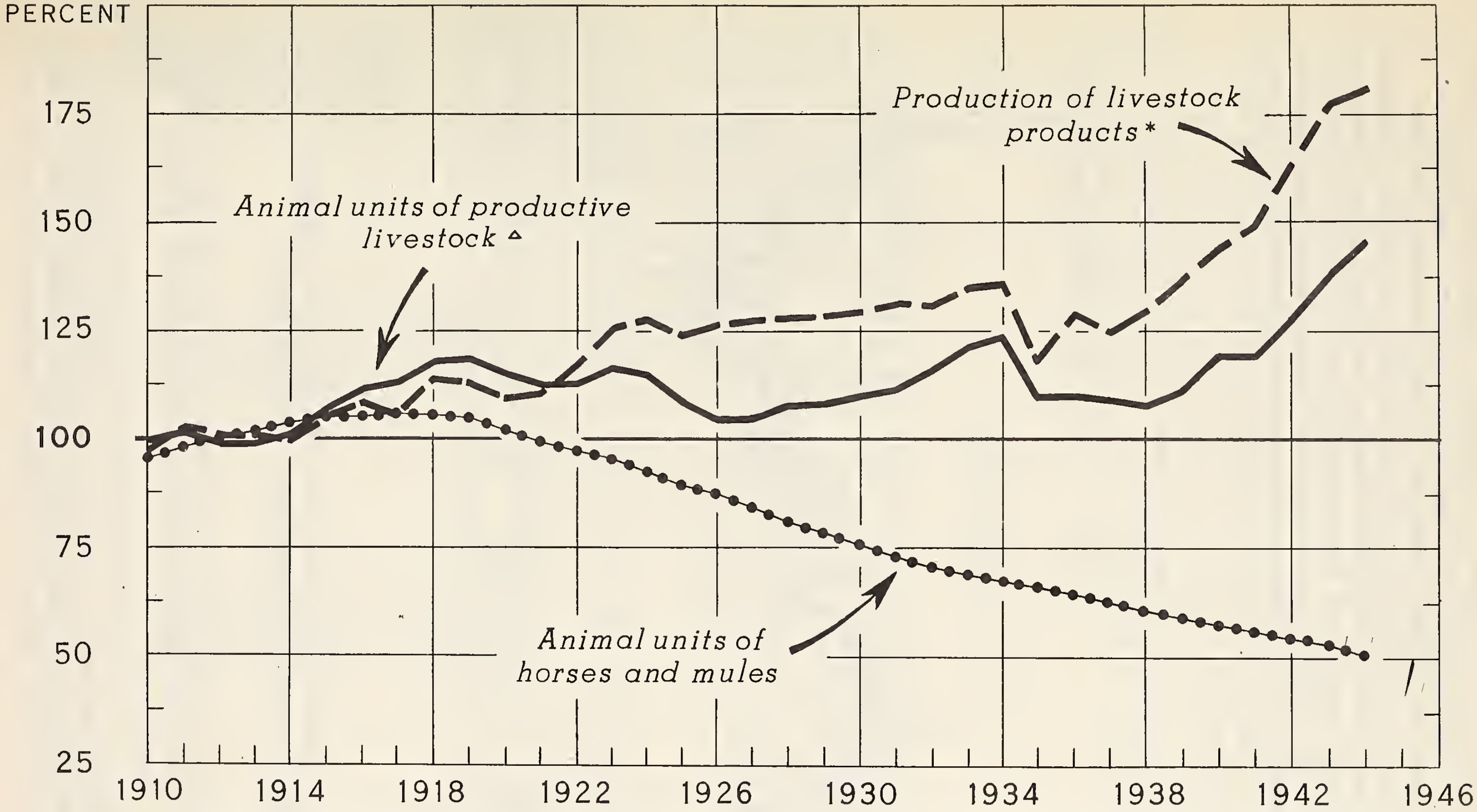
Figure 9.- Supplies of feed concentrates, United States, 1937-44



* TOTAL DRESSED WEIGHT OF ALL MEATS, INCLUDING POULTRY, LARD, EGGS, AND DRY WEIGHT EQUIVALENT OF MILK

△ ALL LIVESTOCK EXCEPT HORSES AND MULES

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Figure 10.- Production of livestock products and number of animal units of livestock on farms,
United States, January 1, 1910-44
Index numbers (1910-1914=100)

The indexes charted in figure 11 indicate a general upward trend in the consumption of grains and other concentrated feeds from 1910 to 1920. Between 1920 and the 1934-36 drought period there was not much change, but the tendency was downward, except in 1931 and 1932. Recovery after the drought from 1937 through 1939 was not so rapid as in feed production because in these years the ever-normal granary of corn was being accumulated. Following 1939 the consumption of concentrates increased rapidly under the combination of circumstances of available reserves of feed, a succession of years of unusually large production, and the wartime need for livestock products.

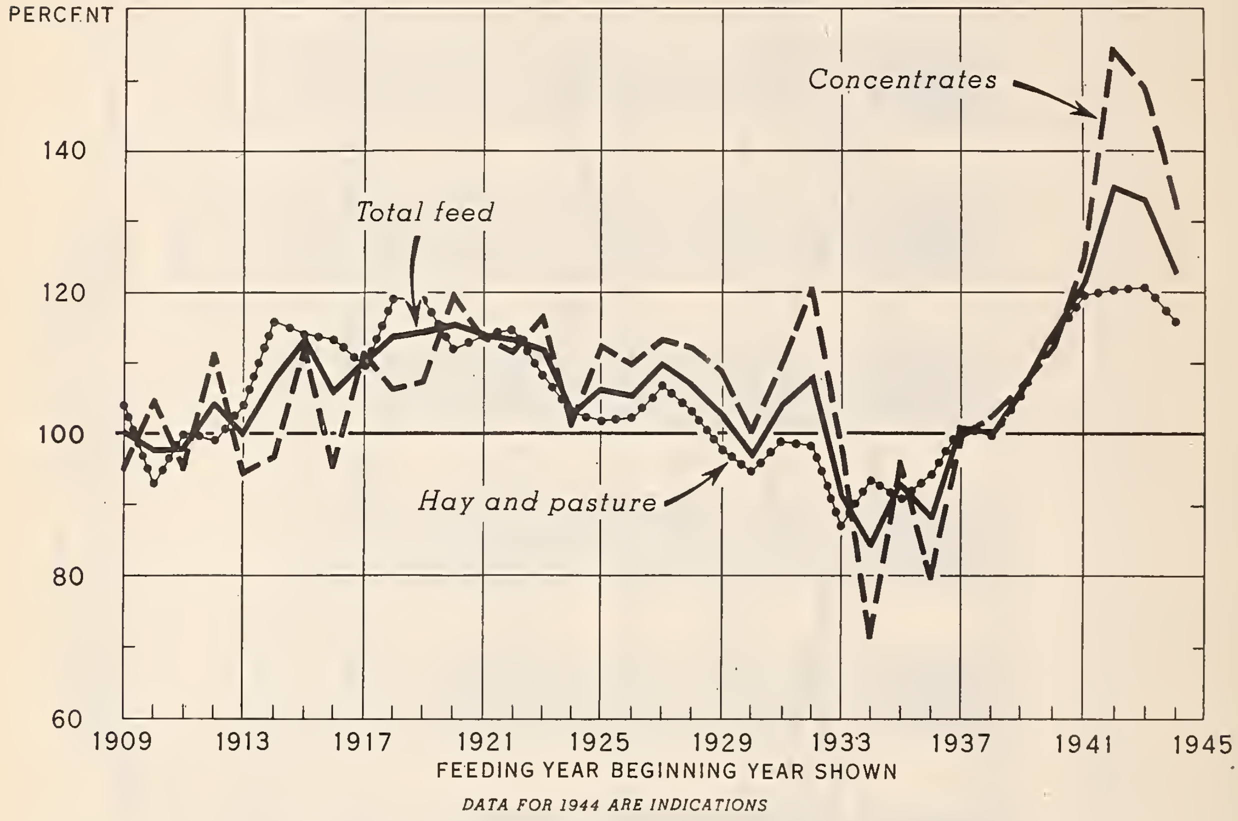

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Figure 11.- Feed consumed by livestock, United States 1909-44
Index numbers of feed units (1909-13=100)

Compared with the trends in the consumption of concentrates, the changes in the consumption of hay and pasture have been more moderate but in the same general directions.

Since about 1920 the upward trend in the production of livestock other than horses and mules has been greater than the upward trend in the disappearance of feeds mainly because the shift from horse to mechanical power, which began about 1918, now makes available about 50-55 million acres more of cropland for the production of meat, milk, and eggs (compare figs. 10 and 11). The saving in feed for horses and mules in grain alone amounted to about 13 million tons in 1944, compared with 1920--enough to feed about 26 million hogs to market weight. Another reason is the higher production per animal or bird which takes less feed per unit of product. For example, milk production per cow was 14 percent more in 1942 than in 1924, and eggs produced per hen increased 46 percent during the same period.

The quantities of grain fed annually to different classes of livestock are shown in figure 12. Aside from the gradual decline since about 1920 in the quantity fed to horses and mules, the greatest changes have been in the quantities fed to hogs and poultry. These changes in the quantities of feed consumed are an indication of the changes in production of the different classes of livestock products.

Hog Production

Hog production has periodically reached new heights during the last 35 years. Just preceding World War I, hog producers suffered enormous losses from cholera, but recovery was rapid during the war until set back by the soft corn crop of 1917, and by the campaign for maximum wheat acreage in 1919 (fig. 13 and table 10). Production rose to a new record in 1923, which was approached in most years from 1926 to 1933 but was not equaled again until 1939. The severe drought in 1934 lowered hog production about 36 percent.

Table 10.- Net live weight production of hogs and proportion of total feed concentrates consumed by hogs, averages 1910-44, annual 1943

Period	Production		Proportion of total concentrates consumed by hogs
	Average	Percentage of 1910-14	
	Million pounds	Percent	Percent
Average			
1910-14	12,260	100.0	30.0
1915-19	13,845	112.9	31.2
1920-24	15,316	124.9	35.7
1925-29	15,438	125.9	36.7
1930-34	15,407	125.7	38.8
1935-39	13,522	110.3	31.0
1940-44	20,343	165.9	37.3
1943 1/	23,676	193.1	39.9

1/ Year beginning October 1.

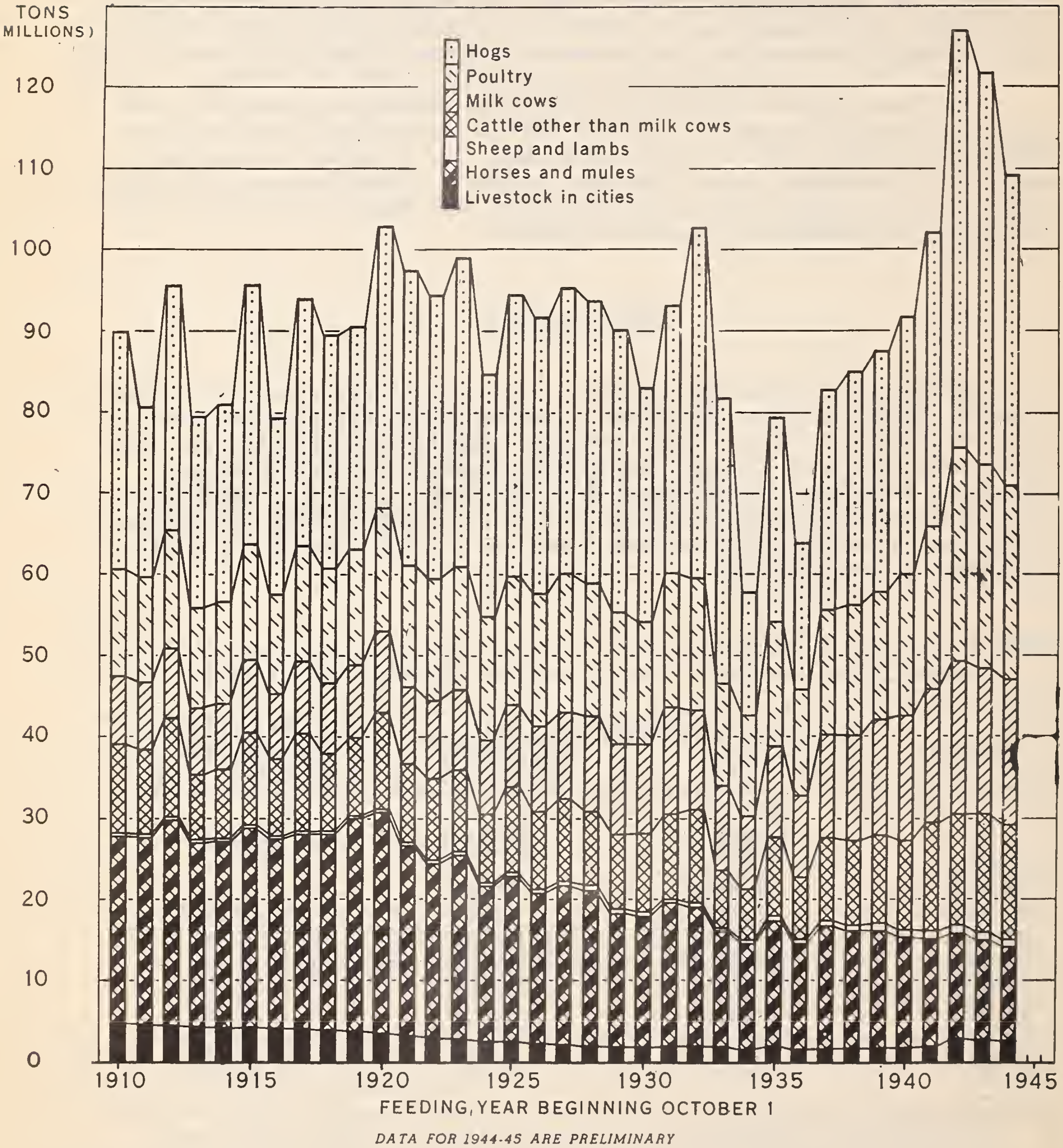

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Figure 12.- Grain fed to different classes of livestock, 1910-11 to 1944-45
(Includes corn, oats, barley, sorghums, wheat, and rye)

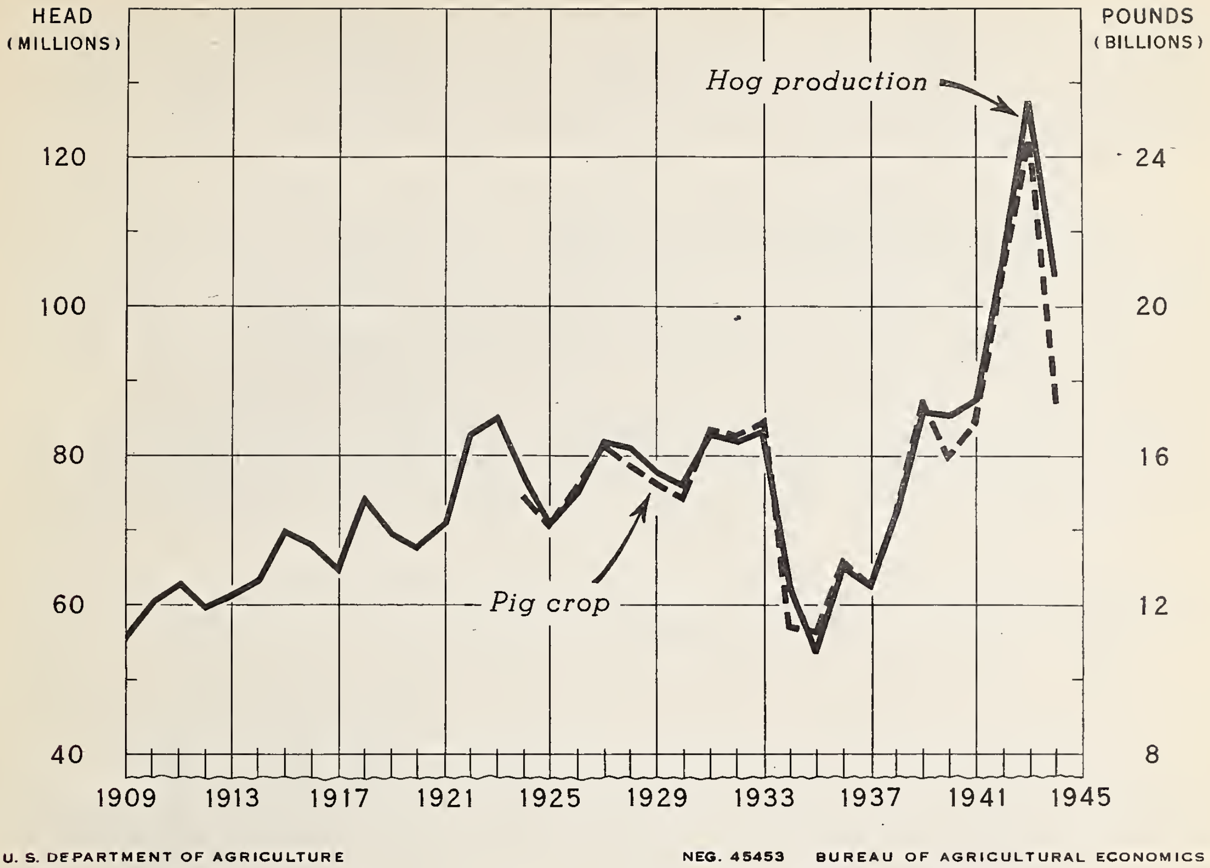

Figure 13.- Pig crop and production of hogs in the United States, 1909-44

Production during World War II rose to unprecedented heights. Responses to the War Food Program for more hogs brought succeeding increases from 1941 through 1943. The pig crop increased from 80 million head in 1940 to 85 million head in 1941, to 105 million in 1942, and to 122 million head in 1943. The average weight of hogs slaughtered increased from 231 pounds in 1940 to 246 pounds in 1943. Although increases in production of all classes of livestock and livestock products were called for, hog production was expanded more rapidly than production of most other kinds of livestock, primarily because it can be expanded more readily but partly because the support prices for hogs were set at relatively higher levels and were effective over a longer period. Production in 1943 was about 50 percent above the prewar record in 1939 and 89 percent above the 5-year average, 1935-39.

This rapid expansion in hog production, and in other classes of livestock, used more feed each year than was produced despite the very large crops harvested. All the reserves accumulated before the war were rapidly exhausted so farmers had to curtail breeding operations for the 1944 spring and fall pig crops to bring hog production in line with the prospective supplies of feed. The break in the hog-corn price ratio and marketing and slaughtering difficulties with the very large 1943 spring crop also contributed to the sharp downturn in the 1944 pig crop. The 1944 spring pig crop was 25 percent and the fall crop was 34 percent below the respective crops in 1943. Consequently, the slaughter of hogs in the 1944-45 marketing year will be about 75 million head compared with 97 million head in 1943-44.

Hog Production Follows Corn Supplies.- Production of hogs normally moves in short cycles 3 to 5 years in length. The basic cause of the changes in production of hogs is found in the changes in the production of corn, which are reflected in hog-corn price ratio. The generally close relationship between the production of corn and the production of hogs is shown in figure 14. In this chart the annual corn crop (adjusted) is plotted against the total live weight of hogs slaughtered under federal inspection in the 12-month period beginning in October of the same year. Federal inspected slaughter covers only about two-thirds of the total hog slaughter, but it is the best index of hog production on a hog-year basis.

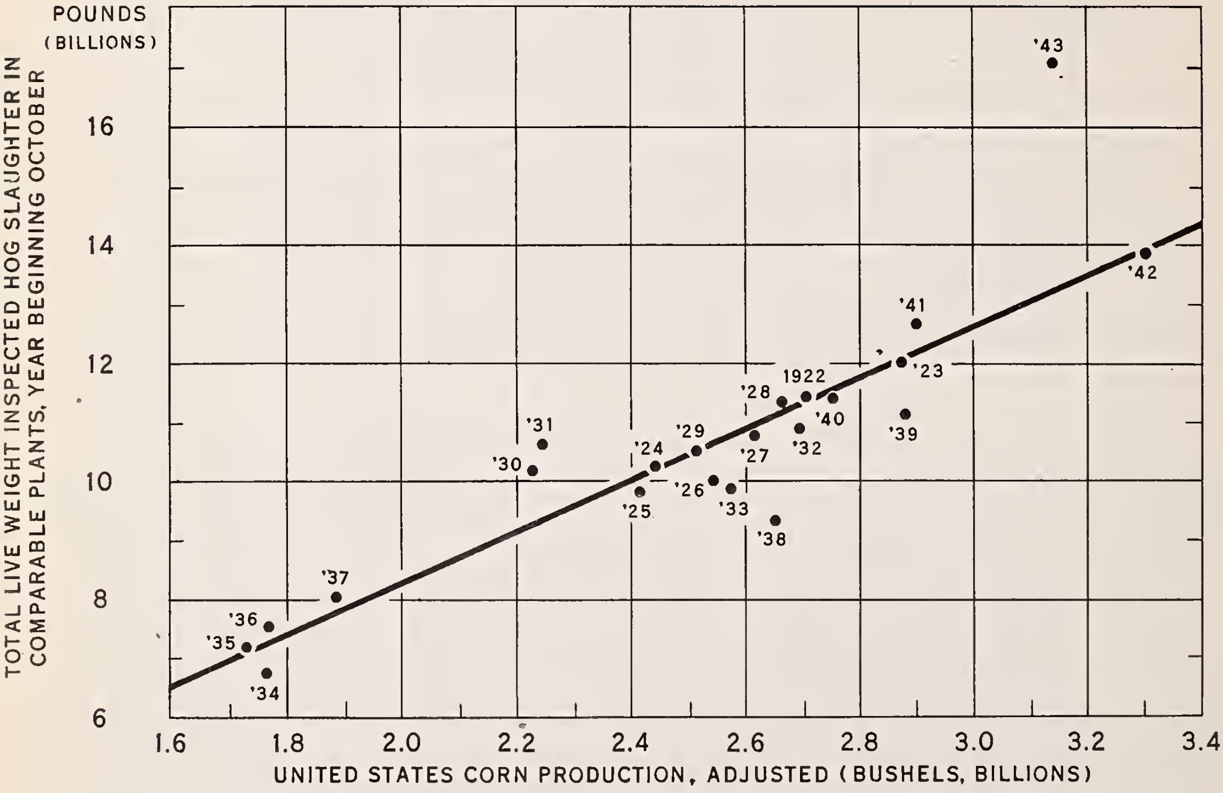

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Figure 14.- Corn production and total live weight of hogs slaughtered under federal inspection, United States, 1922-43

It is necessary to make some adjustment in corn crops that are considerably larger or smaller than the preceding crop because hog production cannot be increased so rapidly as it can be decreased. A moderate increase in production of corn can be met by feeding hogs to heavier weights but when a large corn crop follows a short crop, the number of hogs cannot be brought in line at once. More sows must be bred, and the pigs from the sows bred in December do not reach slaughter weight until the next marketing year. On the other hand, when there is a decided decrease in the corn crop from the year before, the slaughter of hogs decreases rapidly because a herd can be curtailed more quickly than it can be built up. Furthermore, the corn crops of 1938 through 1943 were augmented by unusually large stocks carried over from the preceding crops. 1/

The positive correlation shown in figure 14 is fairly high, except for the years 1930-31, 1938, and 1943. In 1930 and 1931 the short corn crop of 1930 was partially offset by unusually heavy feeding of wheat. In 1938 the production of hogs still had not competely recovered from the droughts of 1934 and 1936. In 1943 and 1944 the proportion of total concentrates fed to hogs was increased from the usual proportion of about 35 percent to more than 40 percent because of the unusually favorable hog-corn price ratio and the Government price-support program (table 10). Moreover, unprecedented quantities of wheat and rye were fed to livestock in those years (fig. 12).

Regional Trends.- Hogs are produced where corn is produced--the Hog Belt is much the same as the Corn Belt. Through pre-drought, drought, and wartime years about 50 percent of the corn and about 50 percent of the hogs have been produced in the five central Corn Belt States (table 11). In the northern Plains, Mountain, Pacific, and Lake States, where considerable quantities of barley are produced, the proportions of the total hog production slightly exceed the proportions of total corn production. The same is true in the southern Plains States where considerable quantities of grain sorghums are grown. On the other hand, the eastern States produce a larger proportion of the corn than of the hogs because a larger part of the corn is used for feeding dairy cows or horses and mules.

1/ The situation described is handled statistically as follows: In years when the corn crop was as much as a third of a billion bushels, more or less, than the year before, the large or small crop was averaged with the preceding crop, giving the small crop a weight of 2. For the years 1937 through 1944 the October carry-over of corn on farms above 250 million bushels was added to the crop for the respective year. The annual total weights of hogs slaughtered under federal inspection since 1942 were adjusted by deducting the slaughter in "Fulmer" plants--those not previously under federal inspection. For a more detailed analysis see, Shepherd, Geoffrey. Controlling Corn and Hog Supplies and Prices, U. S. Dept. Agr. Tech. Bul. 826, 1942.

Table 11.- Hogs: Percentage distribution of live weight production in the United States, by regions, averages 1925-44, annual 1941-44

Period	Corn Belt	Lake States	Northern Plains	Southern Plains	Mountain	Pacific	Appalachian	Miss. Delta	Southeast	Northeast
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Average										
1925-29	46.6	12.1	19.1	4.0	2.1	1.5	6.3	2.4	3.6	2.3
1930-34	47.8	11.5	18.4	4.3	2.0	1.5	6.3	2.6	3.7	1.9
1935-39	48.6	12.7	10.0	4.8	2.0	2.1	8.4	3.9	5.0	2.5
1940-44	50.0	13.2	11.4	4.7	2.4	1.9	7.3	3.0	4.1	2.0
1941	52.2	13.8	9.9	4.3	2.1	2.0	6.9	2.9	4.0	1.9
1942	50.1	13.4	11.7	4.9	2.3	1.9	7.1	2.8	4.0	1.8
1943	47.7	13.1	13.5	5.1	2.7	1.8	7.2	3.0	3.9	2.0
1944	50.3	12.3	11.4	4.5	2.4	1.7	7.6	3.1	4.5	2.2

Just as the Corn Belt and Lake States have tended to produce an increasing proportion of total corn production, so have they tended to produce an increasing proportion of the hogs. This tendency toward concentration of hog production in these States continued through 1942 despite the fact that the percentage increase in production over 1925-29 was greater in all other regions except the Northeast and the northern Plains (fig. 15). During the drought period, the proportion of the total production of hogs that was produced in the northern Plains dropped from 21 percent in 1931 to less than 9 percent in 1937. It did not exceed 11 percent again until 1942, and in 1943 it was only 13.5 percent.

Numbers of Beef Cattle

Cattle are kept for two primary purposes--to produce beef and to produce dairy products. But these two purposes are not mutually exclusive, for more than a third of the beef and veal produced in the United States is from the slaughter of animals from herds kept primarily for the dairy products. Moreover, many dual-purpose cattle are kept, especially in the western Corn Belt, where the emphasis shifts between milk and beef production, depending upon relative prices and other factors. Slaughter of these dual-purpose cattle represents an additional 15 percent of the total production of beef and veal. Hence, only about 50 percent of the total production of beef and veal is from the slaughter of cattle kept primarily for beef. Beef cattle make up the range herds of the West and farm herds scattered throughout the country, particularly in the North Central States. The steers and heifers from which the higher grades of beef are obtained come from these herds. But steers and heifers make up only about 60 percent of the half of the total supply of beef and veal obtained from beef-type cattle. The beef cows and young stock which are culled from the herds make up the other 40 percent.

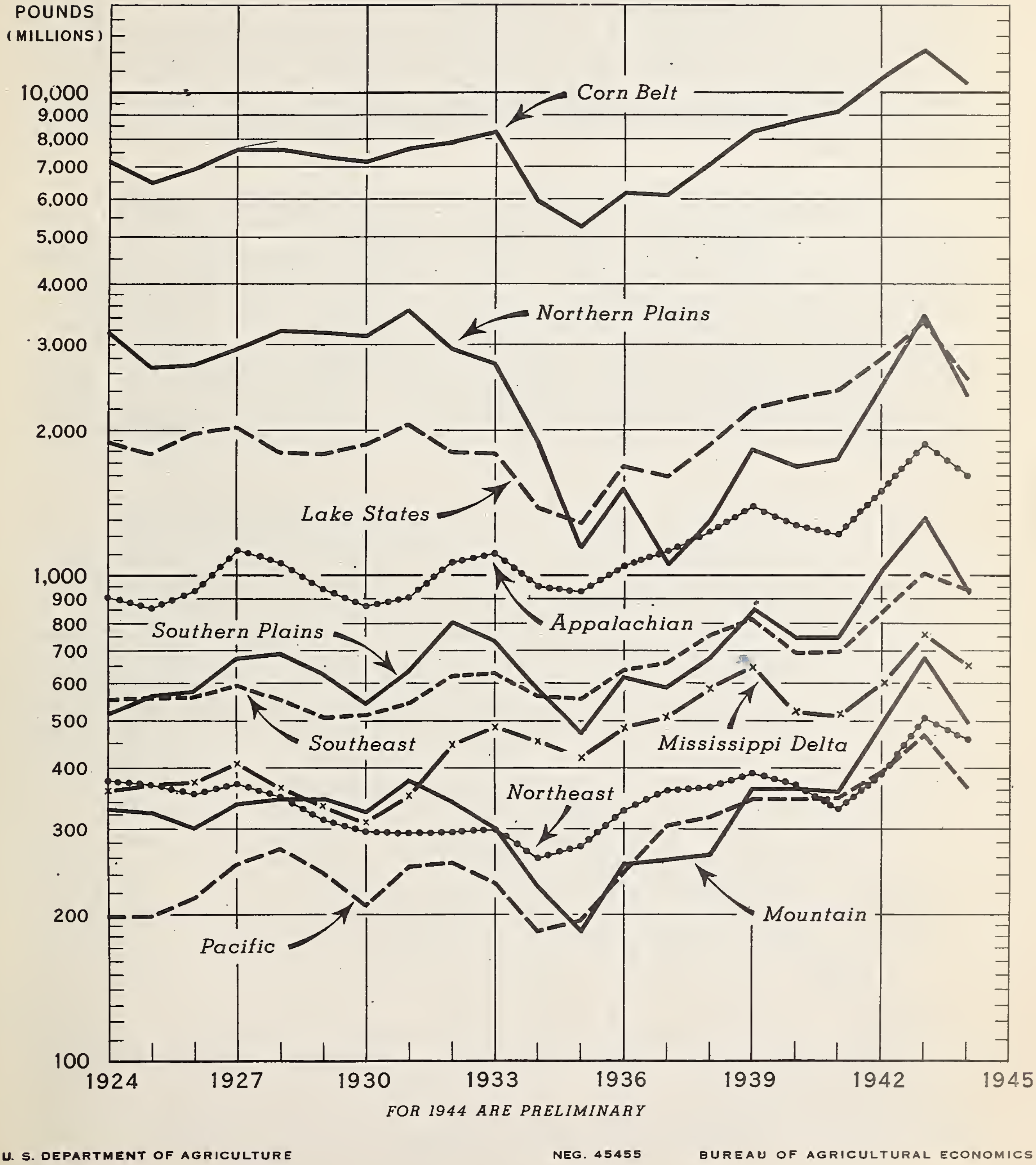
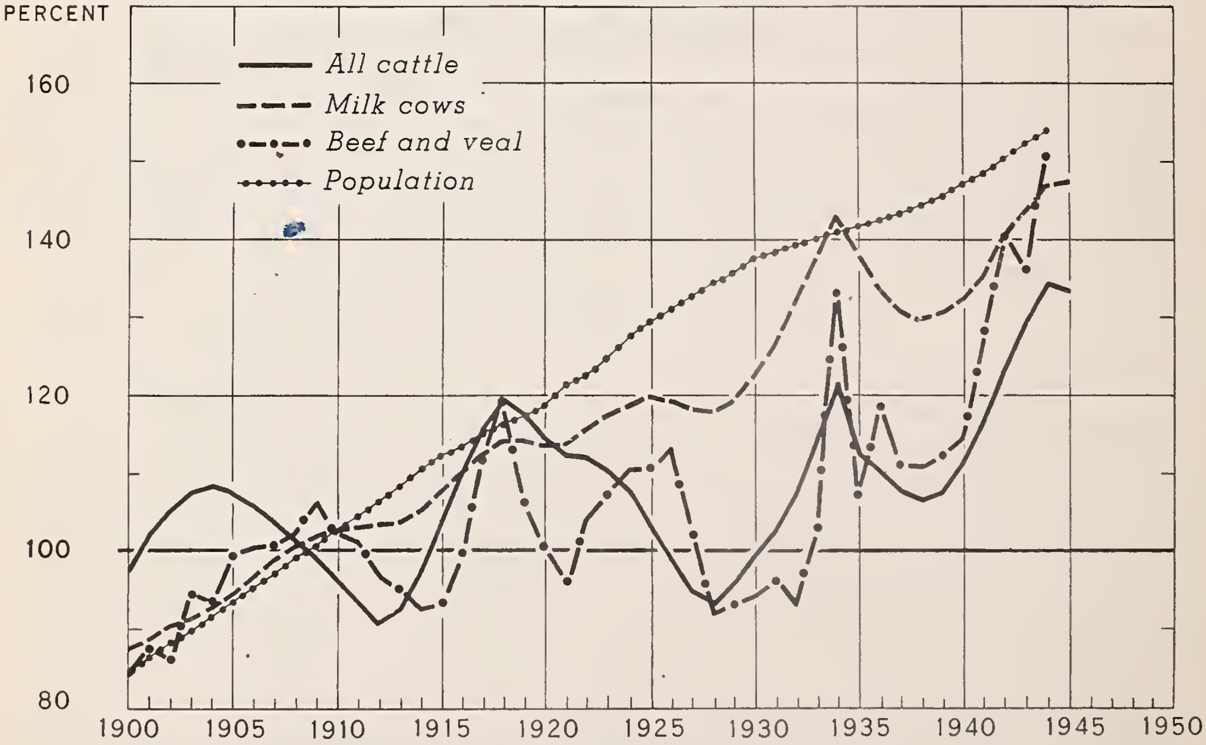


Figure 15.- Production of hogs, by regions, United States, 1924-44

The fattening of cattle on grain and other concentrates is an important part of beef production. In recent years about 5 million head of cattle and calves have been fattened annually in feedlots before they were sent to market for slaughter. This number was divided mostly between the Corn Belt feeding States and the 13 Western States in about a 4 to 1 ratio. It is calculated that cattle feeders added about 1.6 billion pounds annually to the live weight of cattle slaughtered. The dressed-weight equivalent of this addition constituted 10-12 percent of the total production of beef and veal. The dressed-weight equivalent of the additional weight is proportionately higher than the dressed-weight equivalent of the total carcass.

The Cattle Cycle.- The number of all cattle on farms and ranches periodically exceeds a level which can be maintained over a period of years. This characteristic rise and fall of numbers is known as the cattle cycle. The outbreak of World War II coincided with the beginning of an upward cyclical movement which on January 1, 1944 reached a level about 10 percent higher than ever before attained (fig. 16). The upward phase of this cycle has been fairly similar to that of each of two previous cycles which started in 1912 and 1928, the principal difference being that the present cycle started from a higher level. Both the high and the low points of each cycle have been higher than those of the one immediately preceding.



U. S. DEPARTMENT OF AGRICULTURE NEG. 45456 BUREAU OF AGRICULTURAL ECONOMICS

Figure 16.- All cattle and milk cows on farms January 1 compared to production of beef and veal, and to population, United States, 1900-45
Index numbers (1904-13=100)

Dairy cattle have increased more rapidly than cattle intended primarily for beef. In figure 16 it is noticeable that, through the years, the number of dairy cows has followed, in general, a long-time upward trend, somewhat similar to the growth in human population. By contrast, the number of cattle classed as beef animals are now little, if any, higher than in 1920, whereas the present population of the United States is more than 25 percent above the 1920 figure. As dairy-cow numbers have tended to increase rather steadily, it is apparent that the cyclical changes in total numbers are accounted for principally by changes in the number of beef cattle, particularly when decreases occur.

The cyclical pattern of cattle numbers appears to reflect the combined influence of extremes in business activity or weather conditions, and the biological aspects of cattle production. For several years the condition of ranges and pastures, together with wartime prices, have been favorable to building up cattle herds, as evidenced by the increase of 17 million head in the number on farms and ranches between January 1, 1938 and 1944. But it now appears that the peak of the present cycle was reached in 1944. Total slaughter, plus death losses in 1944, exceeded the calf crop of 34 million head. Once a reversal in the trend of numbers occurs, the movement usually continues in the opposite direction for several years because of the time required to liquidate, or to rebuild, breeding herds.

The Beef-Production Cycle.- The annual production of beef and veal also moves in cycles which have some of the characteristics of the cycles of numbers of cattle on farms (fig. 16). The outstanding difference is the tendency for the high and the low points of the beef-production cycle to lag a few years behind those of the cycle of numbers on farms. The annual production of beef normally continues to increase for 3 to 5 years after the turn downward in numbers of cattle on farms because the annual liquidation is added to the large calf crops as they mature for market. On the other hand, the production of beef does not recover until the effect of the small calf crops plus withholding for replacements is offset by the larger calf crops as the cow herds are rebuilt.

An abnormal situation in beef production occurred between 1918 and 1921. During this period the proportion of calves in total slaughter suddenly rose from a level of about 30 percent to a new level of about 40 percent. Another abnormal situation was caused by the drought in 1934 and 1936, when many cattle and calves were slaughtered for the Federal Surplus Relief Corporation. When numbers on farms turned upward in 1938 to start the current cycle, the production of beef also turned upward and the production of beef and veal has been high since, relative to the numbers of cattle and calves on farms, because the slaughter of cows and steers recovered more rapidly than did the slaughter of calves. There was a strong demand for feeder calves from 1940 through 1942 and more heifer calves were being held for herd replacements. Then the average weight of calves slaughtered has been increasing, reflecting a high proportion of beef-type calves in the total calf slaughter. This tended to increase the production of veal per head slaughtered.

Regional Trends.- The number of beef cattle has increased in recent years in both the range States and the rest of the country (fig. 17 and table 12). The rate of increase, however, has not been the same in both sections. During the 5-year period from 1930 through 1934, about 66 percent of the beef cattle were in the 17 Western States (table 13). During the most recent 5 years, 1940-44, the proportion had decreased to 60 percent. This shift is largely accounted for by the almost steady increase since 1928 in the number of beef cattle in the central Corn Belt States. It is in these States that the most rapid gains have been made in shifting from horse to mechanical power and from grass to legume hays and pastures. Both of these gains have increased the forage supplies for feeding cattle. Other Eastern areas, except the Northeast, show about the same pattern of change as the Corn Belt.

Table 12.- Beef animals: Numbers on farms January 1, in the United States, and by groups of States, averages 1920-44, annual 1944-45

Period	17 Western States		5 Corn Belt States		Southern and Appalachian States		Lake States & Northeastern States		United States	
	Number	Percentage of 1935-39	Number	Percentage of 1935-39	Number	Percentage of 1935-39	Number	Percentage of 1935-39	Number	Percentage of 1935-39
	1,000 head	Percent	1,000 head	Percent	1,000 head	Percent	1,000 head	Percent	1,000 head	Percent
Average										
1920-24	23,988	123	6,657	119	5,079	113	2,213	122	37,937	121
1925-29	18,590	95	4,796	85	3,628	81	1,510	83	28,524	91
1930-34	20,693	106	5,098	91	3,960	88	1,692	93	31,443	100
1935-39	19,479	100	5,614	100	4,488	100	1,820	100	31,401	100
1940-44	21,930	113	7,259	129	5,211	116	2,152	118	36,552	116
1944	25,101	129	8,036	143	5,973	133	2,327	128	41,437	132
1945	25,119	129	7,827	139	5,981	133	2,295	126	41,222	131

The droughts of 1934 and 1936 affected the Plains and Mountain States more seriously than the eastern States because the droughts were more severe in the West and the East had a larger supply of coarse roughages to draw upon. The cycles are most pronounced in these areas, and the swings are greatest in the northern Plains. On the whole, there has been less change since 1920 in the number of beef cattle in the three Pacific States than in any other region.

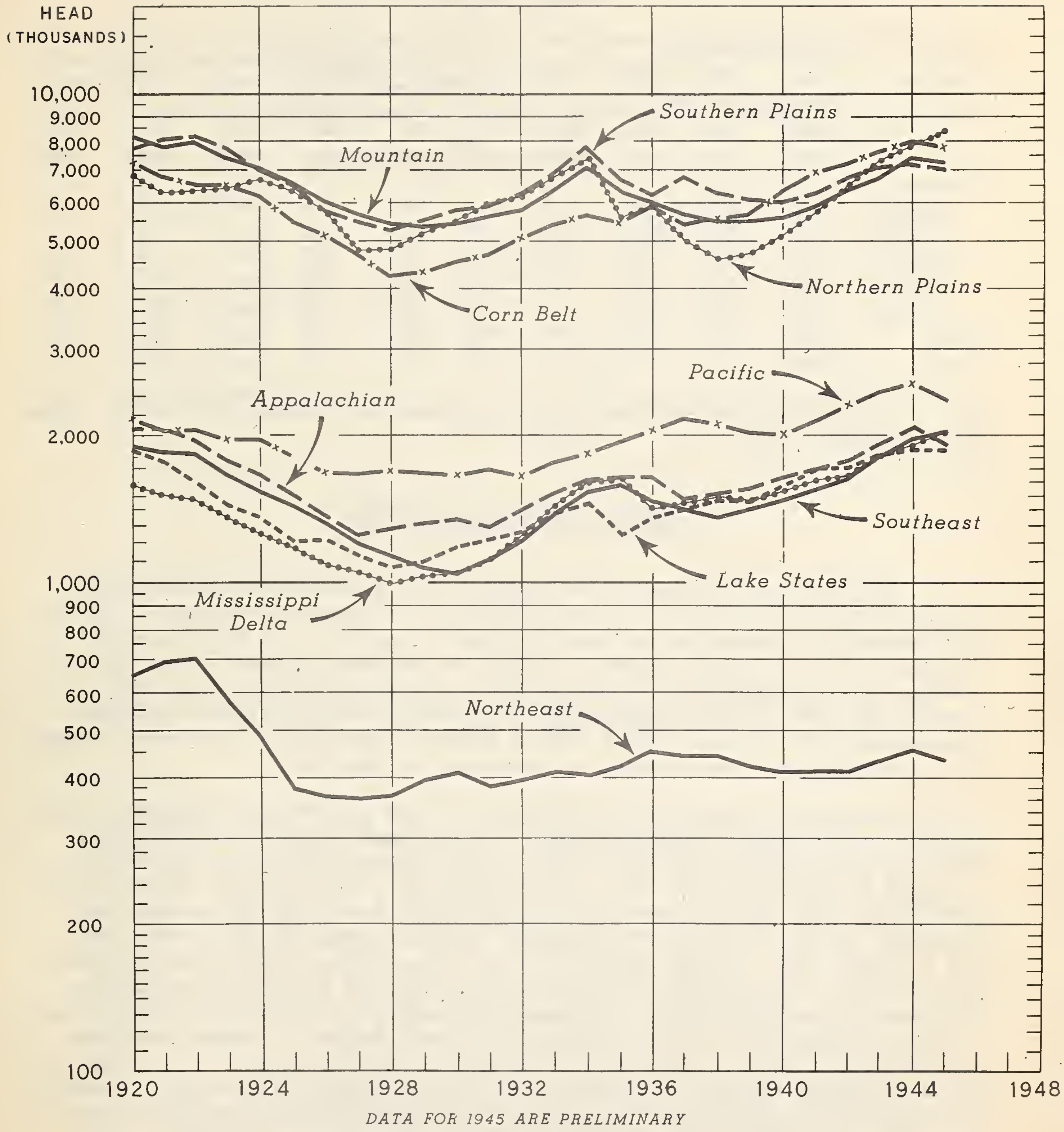


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Figure 17.- Number of cattle and calves kept for beef, by regions, United States, January 1, 1920-45

Table 13.- Beef animals:1/ Percentage distribution of number on farms January 1 in the United States, by regions, averages 1920-44, annual 1944-45

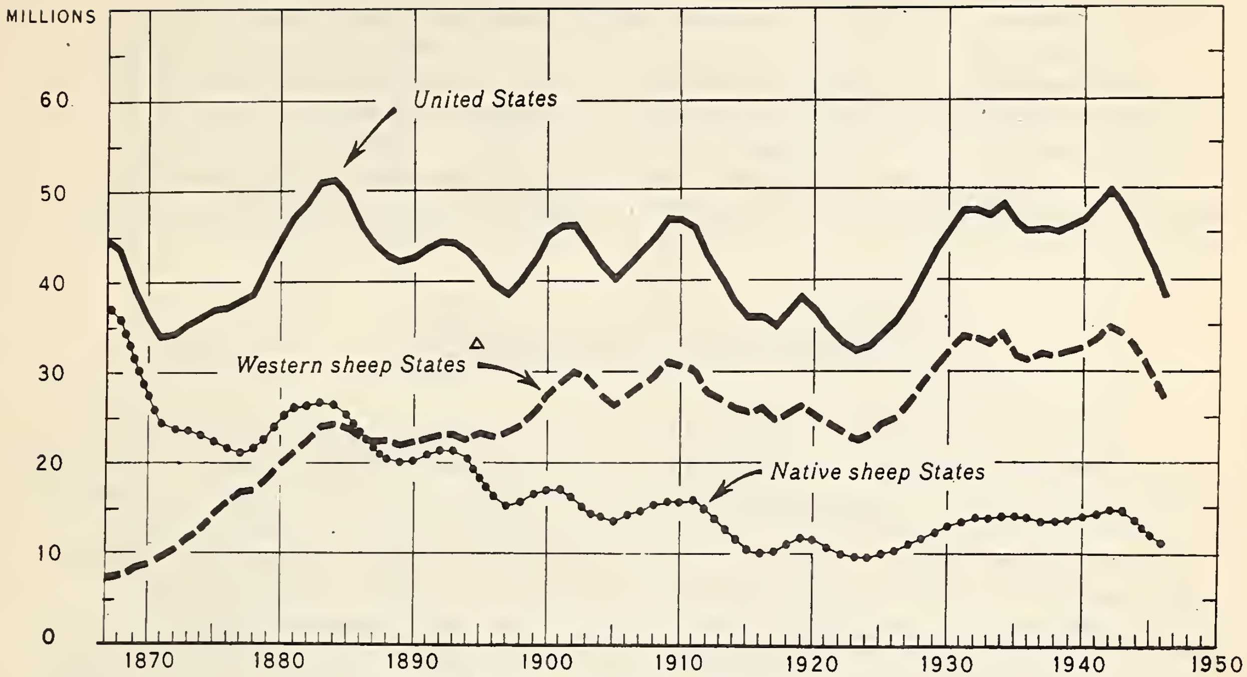
Period	Northern Plains	Southern Plains	Mountain	Pacific	Corn Belt	Lake States	Appalachian	Southeast	Miss. Delta	Northeast
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Average										
1920-24	17.2	20.4	20.2	5.4	17.6	4.2	5.0	4.6	3.8	1.6
1925-29	18.9	20.0	20.3	6.0	16.8	4.0	4.7	4.3	3.7	1.3
1930-34	20.3	20.7	19.3	5.5	16.2	4.1	4.5	4.0	4.1	1.3
1935-39	16.5	20.4	18.5	6.6	17.9	4.4	5.0	4.6	4.7	1.4
1940-44	17.9	18.2	17.6	6.3	19.9	4.7	4.9	4.6	4.7	1.2
1944	19.1	17.4	17.9	6.2	19.4	4.5	4.9	4.8	4.6	1.1
1945	20.5	17.1	17.6	5.7	19.0	4.5	4.7	4.9	4.9	1.1

1/ All cattle and calves other than milk cows and heifers and heifer calves kept for milk cows.

Numbers of Sheep and Lambs

The raising of sheep is an example of a pioneer enterprise which migrated from east to west in this country. It reached its peak of expansion about two decades after the Civil War (fig. 18). At the crest of expansion in the United States in 1884, the numbers of stock sheep in the western sheep States and the native sheep States were about the same. During the next 25 years the trends in these producing regions continued in opposite directions, but at a more moderate rate, with increases in the West somewhat more than offset by decreases in the East.

The sheep industry was subject to severe competition throughout the United States between 1909 and 1923. In the East dairying continued to make inroads on sheep raising, and in those parts of the West where dry farming is important, cattle replaced sheep to a considerable extent. The demand for wool for military uses during World War I greatly stimulated interest in larger flocks; and numbers of stock sheep on farms increased in 1918 and 1919. Large supplies of wool were accumulated during the war, however, which became burdensome during the period of general deflation. Moreover, heavy liquidation of domestic breeding flocks at that time caused a severe congestion of lamb and mutton on the markets. Western sheepmen were severely hit, particularly those who had borrowed heavily in order to increase their flocks. The calling of loans in 1920 followed on the heels of a 3-year drought period on southwestern ranges, and an unusually dry summer and a severe winter (1919) in the northern range States.



*EXCLUDES SHEEP AND LAMBS ON FEED FOR MARKET
△INCLUDES 11 WESTERN STATES, TEXAS, AND SOUTH DAKOTA
DATA FOR 1945 ARE PRELIMINARY; FOR 1946, ESTIMATED

U. S. DEPARTMENT OF AGRICULTURE NEG 32250 BUREAU OF AGRICULTURAL ECONOMICS

Figure 18.- Number of stock sheep and lambs on farms, by regions, January 1, 1867-1946*

With the passing of the financial stringency in the early 1920's, the sheep industry in the United States moved into a new phase. Foreign competition was decreasing rather than increasing, because grain farming and cattle ranching were displacing sheep ranching in Australia and Argentina. The prices of sheep and lambs rose rapidly relative to those for other kinds of meat animals, and they remained unusually steady until the general break in 1930. Under this strong stimulus the number of stock sheep increased to a new record in 1931 in the Western sheep States. The increase in the native sheep States was also noteworthy. Centers of these increases were in Texas, the northern Plains States, Iowa, and Missouri.

This new level was held rather firmly during the depression of the early 1930's until the 1934 drought, and decreases in the drought period were more than regained before the relatively less favorable conditions of World War II.

Shortage of labor and proportionately greater increases in production costs than in prices of lambs during World War II affected the production of sheep, especially on the range, more adversely than that of any other class of livestock. In most of the important range producing areas the ranges were heavily stocked in 1942, but since that year there has been a definite tendency to reduce the numbers of sheep, both by "selling down" and by "quitting". Large numbers of breeding stock have been sold. Stock sheep decreased from 49.8 million head on January 1, 1942 to 41.3 million head on January 1, 1945--the smallest number since 1929.

Prices of Meat Animals and Feeds

Prices received by farmers for all meat animals averaged about the same at the outbreak of World War II as at the start of World War I (fig. 19). In 1939 the prices of hogs and sheep were about 17 percent lower, whereas the prices of beef cattle and lambs were, respectively, 10 percent and 21 percent higher than in 1914. During World War II hog, sheep, and lamb prices have not gone so high as they did in World War I. Monthly hog prices rose rapidly from 1939 through 1941, but they leveled off in March 1942 under the temporary price freeze and later price ceilings. The average farm price of beef cattle, however, has been about 10 to 25 percent above the trend in World War I. Although top prices of beef steers did not go so high as in 1918-19, the prices of lower grades of cattle have been much higher. The relationship of livestock prices to feed prices were much more favorable to livestock production during World War II than it was during the other war.

WARTIME CHANGES IN MEAT PRODUCTION AND CONSUMPTION

Production of meats during World War II increased tremendously over both the prewar years and the peaks of World War I (table 14 and fig. 20). In 1943 and 1944 the production of beef, veal, lamb and mutton, and pork (excluding lard) averaged about 50 percent higher than in the prewar years 1935-39, and 40 percent above the output in 1918. The largest increase was in pork which normally makes up about 52 percent of the total production of meats. The production of pork in 1943 and 1944 averaged about 75 percent above prewar and more than 50 percent above World War I. Beef and veal, which constitutes about 44 percent of the total, averaged about a third above prewar and a fifth higher than in 1918. At the same time that the output of beef and veal was being increased a third, the inventory of cattle and calves on farms was steadily increased to 23 percent above prewar. Lamb and mutton normally make up only from 4 to 5 percent of the total supply of meats. The average production of lamb and mutton during 1943 and 1944 was about 20 percent above prewar and almost double the production during World War I. There has been considerable liquidation of sheep since 1942. The number of sheep and lambs on farms January 1, 1945 was about the same as the average on January 1, 1935-39.

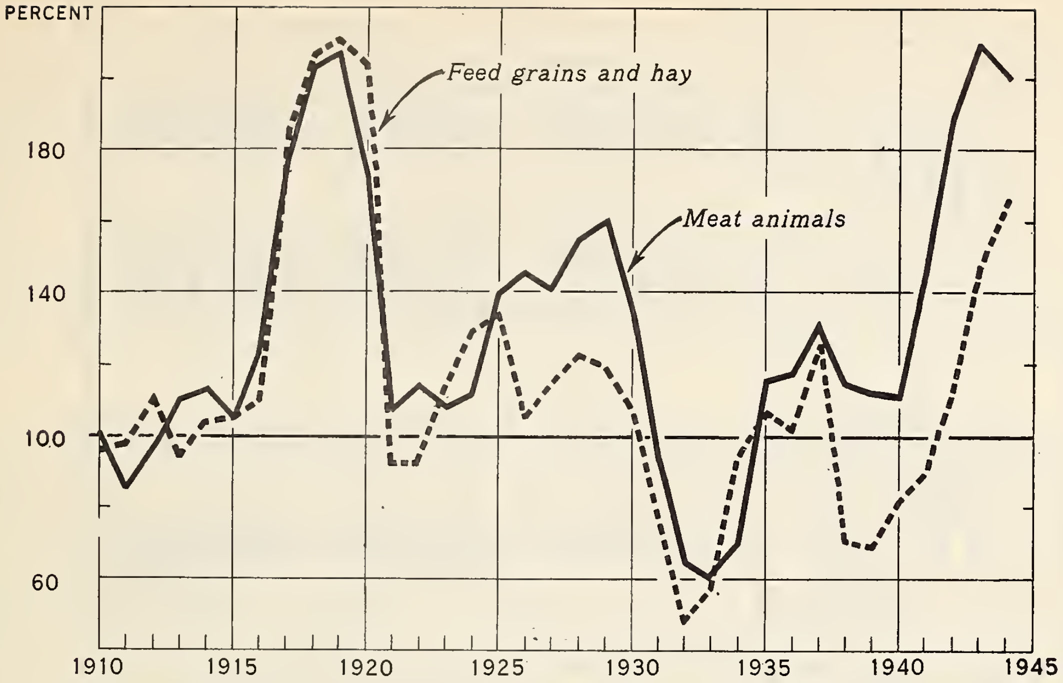


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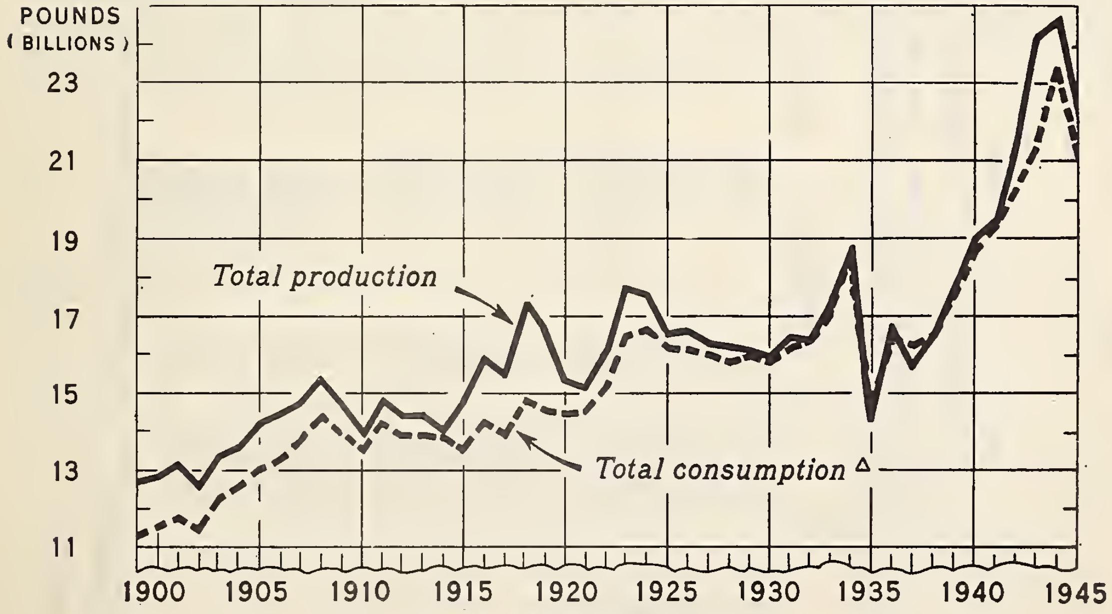
Figure 19.- Prices received by farmers for meat animals and for feed grains and hay, United States, 1910-44
Index numbers (August 1909-July 1914=100)



△ INCLUDING THE ARMED FORCES
DATA FOR 1944 ARE PRELIMINARY, 1945 INDICATED

U. S DEPARTMENT OF AGRICULTURE NEG. 35742-A BUREAU OF AGRICULTURAL ECONOMICS

Figure 20.- Production and consumption of all meats, excluding lard, United States, 1899-1945

Table 14.- Estimated meat production, United States, averages 1910-44, annual 1915-19 and 1940-45

Period	Beef		Veal		Pork, excluding lard		Lamb and mutton		All meats	
	Dressed weight	Percentage of total	Dressed weight	Percentage of total	Dressed weight	Percentage of total	Dressed weight	Percentage of total	Total	Per capita
	Mil. lb.	Percent	Mil. lb.	Percent	Mil. lb.	Percent	Mil. lb.	Percent	Mil. lb.	Pounds
Average										
1910-14	6,326	44	634	4	6,735	47	685	5	14,380	150.4
1915-19	6,851	43	714	4	7,941	50	550	3	16,056	155.7
1920-29	6,452	39	875	5	8,452	52	613	4	16,392	143.1
1930-34	6,480	38	914	5	8,760	52	853	5	17,007	136.3
1935-39	6,936	43	1,038	6	7,337	45	871	6	16,182	125.5
1940-44	8,353	38	1,180	5	11,274	52	995	5	21,802	161.6
1915	6,075	41	590	4	7,616	51	605	4	14,886	148.0
1916	6,460	41	655	4	8,207	51	585	4	15,907	156.0
1917	7,239	46	744	5	7,055	46	463	3	15,501	149.9
1918	7,726	45	760	4	8,349	48	506	3	17,341	165.9
1919	6,756	40	819	5	8,477	51	590	4	16,642	158.4
1940	7,182	38	978	5	9,958	52	877	5	18,995	143.9
1941	8,092	42	1,029	5	9,447	48	925	5	19,493	146.3
1942	8,831	41	1,139	5	10,723	49	1,045	5	21,738	161.4
1943	8,523	35	1,160	5	13,349	55	1,104	5	24,136	176.8
1944 1/	9,137	37	1,595	7	12,893	52	1,023	4	24,648	178.5
1945 2/	9,920	44	1,560	7	10,190	45	1,030	4	22,700	162.5

1/ Preliminary.

2/ Forecast.

These large increases in production of livestock were made possible by record crops of feed grains and forage in recent years and the large reserves of corn and feed wheat accumulated before 1942. Also the United States has been drawing somewhat on Canada's large stocks of grain since 1942. But more important, especially in comparison with production in World War I, is the shifting of feed from horses and mules to other kinds of livestock. Since about 1920 the upward trend in the production of livestock other than horses and mules has been greater than the upward trend in the disappearance of feeds mainly because the shift from horse to mechanical power, which began about 1918, now makes available about 50 to 55 million acres of cropland for the production of meat and other livestock products.

Consumption of meat in the United States from 1925 until the onset of the war was just about the same as the annual production, which had remained fairly steady except for the disturbances caused by the 1934 and 1936 droughts (fig. 20). Because production was not increasing along with the population, the general trend in per capita production and consumption had been declining for several years before the war (table 14 and fig. 21). But the tremendous increases in annual production of meats per capita during the war made it possible for the civilian population, which was larger than the total population in 1937, to eat as much or more meat per person than was consumed during 15 of the 20 inter-war years. Annual per capita civilian consumption of meats rose from an average of 125.6 pounds in 1935-39 to an average of 141.2 pounds in 1940-44. The high rate of consumption in war years was maintained at the same time that the military services and foreign shipments took more than a fourth of the total supplies of all meats (fig. 22). In 1944 these noncivilian claimants took about 28 percent of the supplies of pork, 23 percent of the beef and veal, and 20 percent of the lamb and mutton. These proportions were even higher in 1943.

SITUATION IN NEAR FUTURE

Even though the war is over, almost as large an output will be needed for another year or two if the conversion from war to peace is managed in such a way as to maintain a reasonably high level of employment and if some of the continuing needs for meat for relief and rehabilitation in liberated countries are filled. During the reconversion period the civilian population in the United States will want a large volume of meat. Even with a moderate decrease in buying power, due to shortening of hours of work and some unemployment, 142 million domestic consumers, including those still in the armed forces, probably would take an average of 145 to 150 pounds of meat per capita at prices in line with the level of farm prices which Congress has directed the Secretary of Agriculture to support. Wartime experience demonstrates how demand for meat increases when the national income is high and also widely distributed. Thus, domestic consumption alone would be in the neighborhood of 20 to 21 billion pounds of meat. Present indications are not clear as to how much the requirements will be for overseas relief and rehabilitation, but all agree that considerable quantities of food will be needed from the United States until

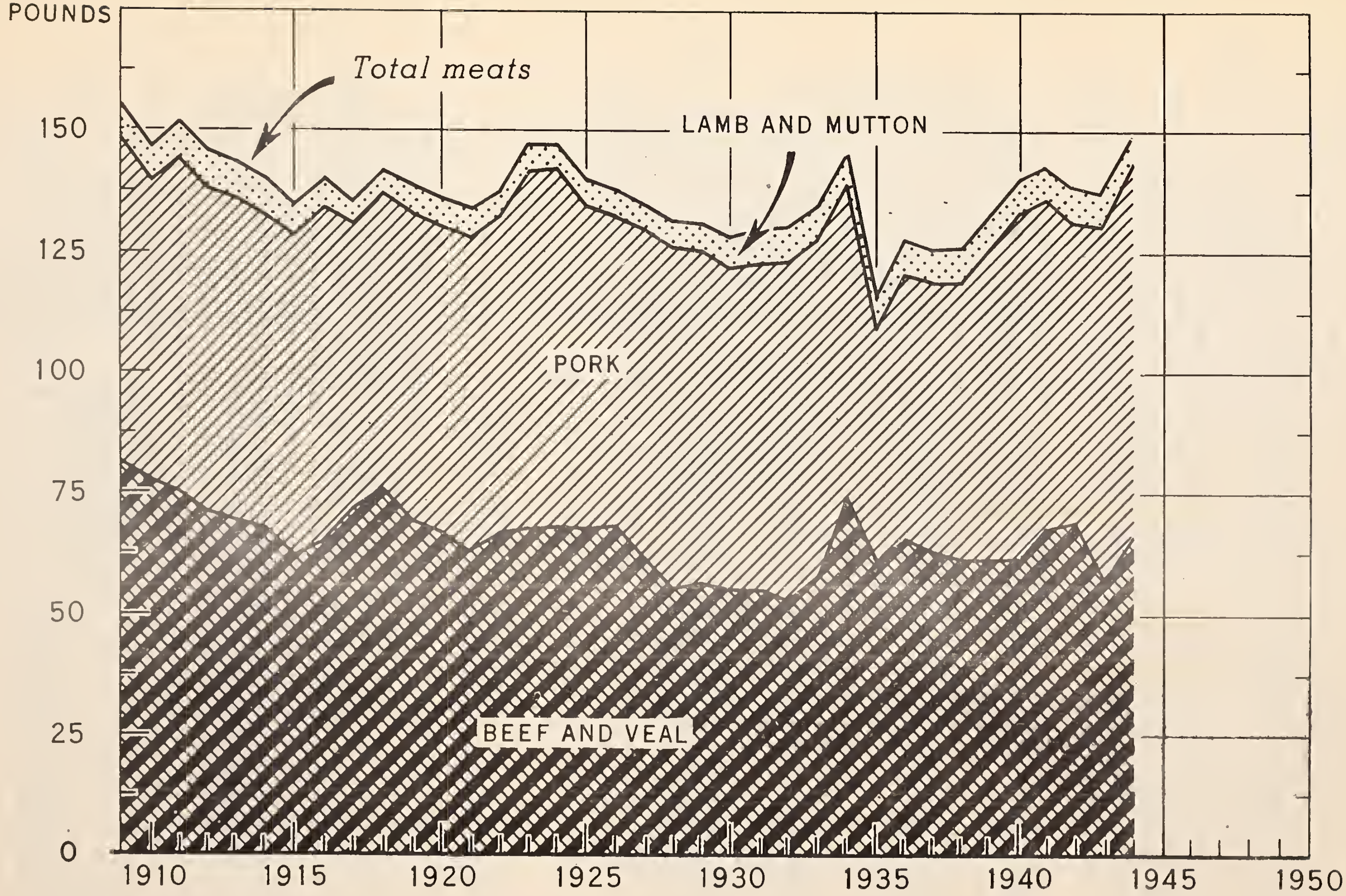


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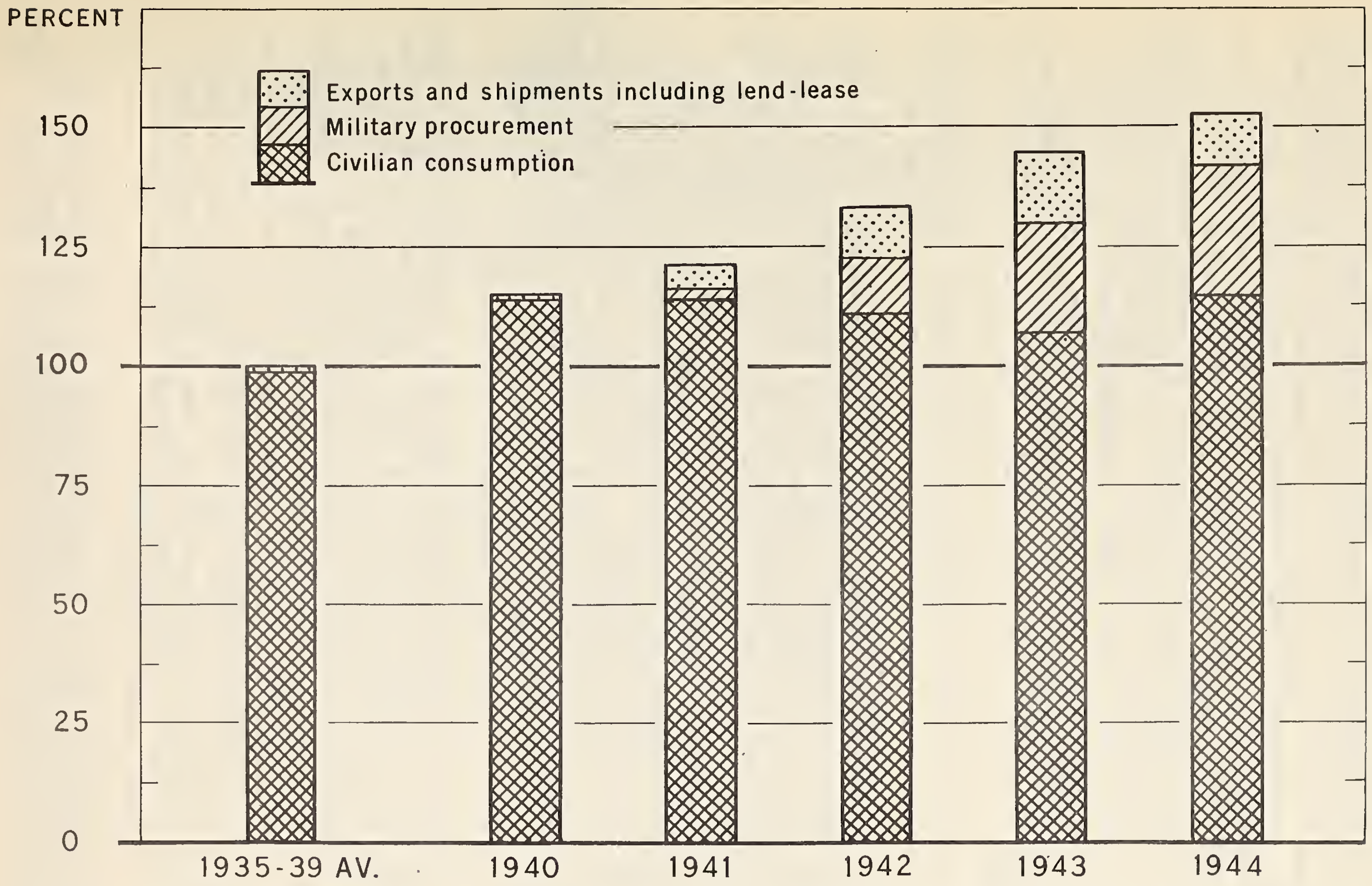
Figure 21.- Apparent per capita civilian consumption of all meats, by kind, United States, 1909-44 (dressed weight basis)



U. S. DEPARTMENT OF AGRICULTURE

NEG. 45087 BUREAU OF AGRICULTURAL ECONOMICS

Figure 22.- Distribution of meat supplies, United States, average 1935-39, annual 1940-44
Index numbers (1935-39=100)

the reconstruction task is well under way. Some of these needs probably will be filled with commercial exports if supplies are available.

For at least a part of the reconversion period farmers already have assurance of substantial aid in supporting farm prices under the so-called Steagall Amendment and the Agricultural Adjustment Act of 1938 as amended by the Act approved October 2, 1942. Congress has directed the Secretary of Agriculture to support prices of the six basic agricultural commodities and of other commodities for which substantial increases in production have been formally requested at not less than 90 percent of parity (85 percent for feed crops and 92.5 percent for cotton) for 2 years from January 1 following the date on which the President or the Congress shall have proclaimed hostilities to have ended. Among the meat animals, only hogs have been specifically designated. Beef cattle, veal calves, sheep and lambs, and wool have not been designated. The Government has operated a wartime purchase program for domestic wool since April 1943 as a protection to domestic growers.

Meat production in 1945 probably will fall short of the production in 1944 by about 2 billion pounds. Although the production of beef and veal is expected to be about 7 percent above last year, the output of pork is likely to be as much as 20 percent under the 1944 production. The number of hogs available for slaughter is smaller in 1945 than it was in 1944 because farmers found it necessary to adjust their breeding for the 1944 spring and fall pig crops to the narrowing hog-corn price ratio and to the impending scarcity of feed grains in the spring and summer of 1944. The decrease in the output of pork will not be so great as the decrease in the number of hogs slaughtered, however, because more ample supplies of feed and a more favorable hog-corn price ratio now than was expected a year ago at breeding time are encouraging farmers to feed hogs to much heavier weights. A new record above the average of 246 pounds in 1943 and 240 pounds in 1944 seems likely in 1945. The slaughter of sheep and lambs which dropped off in 1944 will be even smaller in 1945 because of the heavy liquidation of breeding stock during the last 3 years. Slaughter of sheep and lambs in 1945 is now expected to be about 2 percent less than in 1944.

Even though the record corn crop in 1944 made supplies of grain seem ample for restoring, in 1945-46, some of the large recession in hog production that occurred in 1944-45, the number of hogs available for slaughter during the 1945-46 marketing year will not be any larger than in the preceding year. Farmers are raising 7 percent fewer spring pigs in 1945 than in 1944, and have reported their intentions to breed only 13 percent more sows for farrowing in the fall of 1945. Thus, present indications are that the total pig crop in 1945, which will go to market largely in 1946, will be approximately the same as the 1944 crop. If the 1946 pig crop is about the same as that in 1945, as now seems likely, about 78 million hogs will be slaughtered in 1946 and in 1947, and, at average weights, they would yield about 10 billion pounds of pork.

If the slaughter of cattle and calves comes up to present expectations of about 35 million head, the number on farms will be about a million head smaller at the end of the year than at its beginning. The annual slaughter of cattle and calves probably will continue to be large until producers have done considerable culling of their herds. The current output of beef and veal (11-11.5 billion pounds) could be maintained through 1947 without reducing the total number of cattle and calves on farms below the number needed to make optimum use of the usual grazing and winter forage resources.

The number of sheep and lambs slaughtered annually during the next few years will likely be considerably less than during any of the last four years, when numbers on farms were being progressively reduced. The recent annual reductions in the number of ewes probably will not continue at the same rate again in 1946, and the lamb crop will be smaller because the number of ewes now on farms is less than in many years.

Summarized on the basis of the above expectations regarding the total slaughter of hogs, cattle and calves, and sheep and lambs, the total annual output of meat in the next two years would be 22-23 billion pounds. Allowing 500-600 million pounds for export, the remaining output of meat would be about in balance with the estimated upper limits of the domestic demand for meat.

This level of production of meat animals, together with about the same level of production of dairy and poultry products as in 1945, would also be about in balance with the supply of feed grains available for feeding livestock in the 1945-46 feeding year. The calculated carry-over of feed grains at the end of the 1945-46 feeding year, assuming this level of livestock production and prospective nonfeed uses and exports, is about 14 million tons, which would be about the same as it was at the beginning of the period. But conditions in 1945--production payments for dairy products and the need for supplementing a scarce supply of meat with poultry products--were particularly favorable to reaching a wartime peak in the production of these products. The incentives for production of these products will probably be somewhat less in 1946, and if production is smaller, stocks of feed grains will probably be somewhat larger at the end than at the beginning of the 1945-46 feeding year, unless frost damage of the 1945 corn crop is so extensive as to affect the usual quantity of corn used in producing a unit of livestock and poultry products. Moreover, if the production of livestock during the next two years is no larger than here assumed, the stocks of feed grains carried over into the 1947-48 feeding year will likely be even larger than a year earlier, unless farmers begin in 1946 to shift the use of a considerable acreage of cropland from feed grains to other crops.

SOME LONGER-TIME POSTWAR PROSPECTS

Feed Grains

During the war an increasing number of farmers were expressing concern about the intensive use of their land. Now that the emergency is over many farmers, particularly among those in the Corn Belt and Lake States, are likely to return to a cropping system which includes more grasses or legumes and less corn if postwar prices of feed grains and livestock are high enough to permit adjustments toward stabilization of the productivity of the soil and of farm income.

In the Southeastern States, the shifting from corn to oats which produce more feed per acre is likely to continue. On the other hand, most of the gradual recovery from the drought setback in the acreage of corn in the Great Plains and Mountain States probably will be maintained. In the northern States of these regions, further recovery appears likely; but in the region as a whole the full height of the pre-drought acreage of corn probably could not be maintained over a period of years. For the United States as a whole, a postwar acreage of corn about the same as in 1940 (88-89 million acres planted) would permit (1) some restoration and maintenance of the productivity of the soil in the principal corn producing areas, and (2) desirable shifts in crop production in non-commercial areas. Attainment of the first objective in the Corn Belt would mean approximately a 15-percent reduction from the wartime acreage of corn.

The larger acreages of hay and pasture crops would require a large acreage of oats in some of the Corn Belt States to serve as a nurse crop for new seedings of these crops. Some of the acreage taken out of corn (and soybeans) would be used for growing oats. This will be encouraged by the recent development of the new higher-yielding varieties of oats. The acreages of both oats and barley probably will be increased in the northern Plains and Mountain States as a part of a program of more diversified farming. Better winter varieties of oats and barley for the South will contribute to further expansion in that region. Thus, there are indications that the postwar acreage of oats might be as much as 2 million acres more and of barley as much as 1 million more than the 1944 acreages.

Consideration of the postwar situation for sorghums for grain has its drawbacks. Both the acreage planted and the proportion of the crop harvested for grain have increased substantially since the drought. The development of new and higher-yielding varieties adapted to harvesting with a combine, and a ratio between the prices of sorghums and cotton or wheat that has been favorable to sorghums, have contributed to this increase. The shortage of other feed grains, and the high prices and the widening of the market for sorghums in 1943 and 1944 also contributed to the very sharp increase in the proportion of the crop harvested for grain in 1944.

With a plentiful supply of other feed grains after the war, so large a proportion of the sorghum crop probably would not be harvested for grain. The total acreage of sorghums during the next few years, however, probably will fluctuate around 18 million acres (the 1944 acreage), with from 40 to 50 percent of the acreage harvested for grain. A harvested acreage that large would be about 50 percent more than the average acreage harvested for grain from a total of about 17.5 million acres planted for all purposes in 1937-41.

If the acreages mentioned for the four feed grains are either planted or harvested, the normal expectancy for total production of feed grains would exceed the prewar level because higher yields per acre can be expected with average weather (table 15). Reference has been made to recent achievements in this direction. The remarkable increase in the yield per acre of corn will more than offset the probable reduction in the total acreage. The higher yields per acre of oats and barley would be harvested from more acres.

Table 15.- Crop yields per acre harvested of specified grains, United States, averages 1880-1941, annual 1942-44, probable 1945, and potential 1950

Period	All corn		Oats		Barley		Sorghums for grain	
	Yield per acre	Percentage of 1945	Yield per acre	Percentage of 1945	Yield per acre	Percentage of 1945	Yield per acre	Percentage of 1945
	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.
Average								
1880-99	25.9	81	27.5	86	23.7	103	--	--
1900-19	26.6	83	29.9	93	23.2	101	--	--
1920-29	26.8	84	29.7	93	22.7	99	17.1	101
1930-36	21.4	67	26.1	82	19.9	87	12.4	73
1937-41	28.9	90	31.6	99	23.3	101	14.5	85
1942	35.2	110	35.6	111	25.5	111	18.2	107
1943	32.1	100	29.6	92	21.9	95	15.6	92
1944	33.2	104	29.9	93	23.0	100	19.9	117
1945 Probable 1/	32.0	100	32.0	100	23.0	100	17.0	100
1950 Potential 2/	38.8	121	38.5	120	23.8	103	16.6	98

1/ With normal growing weather.

2/ See, Farming Adjustments After the War--Possibilities Under Prosperity Conditions, U. S. Department of Agriculture in Cooperation with the Land-Grant Colleges, June 1945 (mimeographed).

Some further advancement seems almost certain from wider use of new improved varieties of seed, increased use of fertilizer, and better tillage machinery, as more of each becomes available now that the war is over. Considerably more advancement in the use of improved practices will be profitable to farmers if the conversion from war to peace is carried out in a way that will maintain a reasonably high level of employment and national income. Recent studies made by State Production Adjustment Committees of the possibilities for improvement in yield indicate that in a prosperous agriculture it would pay farmers to use approved practices that might be expected to lift yields of corn and oats above the computed "probable" for 1945 by as much as 20 percent, and to maintain the yields of barley and sorghums harvested for grain at about the 1945 level, with normal growing weather (table 15).

Assuming only the computed "probable" yields for 1945 and the postwar acreages herein mentioned, the total tonnage of feed grains would be about 11 million tons more than the average production in 1937-41 (also in 1928-32)--but 8.5 million tons less than the average wartime production in 1942-44. Any part of the estimated potential increases in acre yields set forth above would, of course, increase production proportionately and add to the difference in comparison with prewar years. Full attainment of the estimated possibilities for increases in yields on the mentioned postwar acreages would raise the total production of feed grains almost 8 million tons above the average wartime production from 1942 through 1944.

If a reasonably high national income is not maintained and farm incomes are low, the influences tending toward increased yields would be considerably weakened. But so would the possibilities of downward adjustments in the acreage of corn. It is necessary only to recall the situation that prevailed after World War I and again during the period 1930-33 to anticipate how farmers would react to low prices. They would likely try to offset falling prices by maintaining the acreage of corn near the wartime peak. That would mean an annual production of feed grains of about 118 million tons, assuming current "probable" yields per acre.

Whether market outlets at satisfactory prices will be available in the postwar period for so large an output of feed grains will depend mainly upon the evolving situation with respect to livestock. They normally consume about 85 percent of the annual production of feed grains.

Each additional ton of feed grains (when matched with the usual proportions of protein supplements and forage) would provide feed for producing about 1.4 additional composite units of livestock production. 2/ For example, if the quantity of feed grains fed in the postwar period should be 11 million tons more than the average in 1937-41, the number of units of all livestock production would be increased more than 15 millions--the equivalent of the production of about 15 million average milk cows. Moreover, the additions to livestock production other than horses and mules would be even greater than 15 million units because the downward trend in the number of work animals is expected to continue.

The estimated decline in numbers of horses and mules from the average of 1937-41 to 1950 is the equivalent, in terms of feed consumed, of nearly 6 million livestock production units. Thus the increase in total production of livestock other than horses and mules would be nearly 21 million units.

2/ A unit of livestock production is 4,237 pounds of milk, 314 pounds of hogs, 833 pounds of cattle, 3,704 pounds of sheep and lambs, 185 dozen eggs, 70 chickens produced, 116 broilers produced, 20 turkeys produced, or .695 horses or mules fed a year. Each of the quantities of livestock production uses the same quantity of feed concentrates (average for the United States).

Meat Animals

A High Level of Cattle Production.- Several changes in the cattle enterprise have been favorable to a general upward trend in January 1 inventories of cattle. First, dairy cattle have increased more rapidly than cattle intended primarily for beef (fig. 16). Second, the composition of beef cattle herds changed remarkably between 1900 and 1940 in the direction of lowering the average age and hence the average feed requirements per head of beef animals other than cows and bulls. Steers 1 year old or older constituted about 36 percent of the total number of beef animals on January 1, 1900, 25 percent in 1920, and about 17 in 1940. On corresponding dates calves constituted 22 percent, 30 percent, and 34 percent, respectively, of the total number of beef animals. Cattle raisers, especially in the Great Plains, have shifted largely to a cow-and-calf basis. Cattle feeders demanded animals that could be finished into young high Good or Choice grade slaughter animals, and midwestern and eastern markets for 2- and 3-year-old range steers became more and more limited. Young dairy animals also were comprising a progressively larger proportion of the total number of cattle. Third, the carrying capacity of hay and grazing land in terms of numbers of cattle has been increased progressively since 1918 by the decline in numbers of horses and mules. Between 1918 and 1944 the decline in the number of horses and mules released enough hay and pasture to feed the equivalent of about 16.5 million additional cattle and calves. Furthermore, the total feed units of hay and forage consumed by livestock have been slightly larger in recent years than at any other time since 1910 (fig. 11).

The analysis of changes in the number of beef cattle showed that they have increased in recent years both in the range States and in the rest of the country. The rate of increase, however, has not been the same, nor have both sections shared alike in the conditions favorable to sustained increases. During the 5-year period, 1930-34, about 66 percent of the beef cattle were in the 17 Western States. During the most recent 5 years, 1940-44, the proportion had decreased to 60 percent. This shift is accounted for mainly by the almost steady increase since 1928 in the number of beef cattle in the central Corn Belt States. It is in these States that the greatest gains have been made in shifting from horse to mechanical power and from grass to legume hays and pastures, both of which have increased forage supplies for feeding cattle. The pattern of change in other regions east of the Great Plains, except the Northeast, was about the same as in the Corn Belt (fig. 17).

The almost steadily upward trend since 1928 in the number of cattle and calves in the Corn Belt and other Eastern States was arrested in 1944. It may be moderately reversed during the next few years, because pressure for meat because of immediate postwar requirements will encourage heavy marketings. It will be good business to cull closely while there is a strong market. But as postwar adjustments in crop production are made in these States, feed will be available to support even more cattle and calves than are now on farms. Adjustments in the direction of more and better quality hay and pastures will be foremost in the postwar plans of farmers in the Corn and Cotton Belts.

The droughts of 1934 and 1936 affected cattle raising in the Great Plains and Mountain States more seriously than it did in States east of the Great Plains, because the drought was more severe in the West and because a large supply of coarse roughages that can be drawn upon in an emergency is always available in the Eastern States. The cattle cycles always have been most pronounced in the range States, and the swings have been greatest in the northern Plains, partly because milk cows are a relatively small proportion of the total number of cattle in the range area.

Reports of State Production Adjustment Committees for the range States emphasize the desirability of still closer culling of herds to bring them within safe limits from the standpoint of the supply of feed that is ordinarily available. Many ranges are over-stocked for ordinary rainfall conditions; fewer cattle would produce a greater total gain in weight, except when grazing conditions are unusually good. Moreover, the recent shift on many ranges from sheep to cattle does not make the best use of range feed. The numbers of cattle and sheep in the range States should be so adjusted as to produce the maximum sustained output of meat from the available range and winter forage. The committees have estimated the extent of this adjustment in the 17 Western States as being about 3 percent below the number on farms and ranches on January 1, 1943.

Considering the prospective production situation for cattle in different parts of the country, the feed supply in the postwar period is likely to be ample for supporting a level of all cattle numbers (beef and dairy) somewhat higher than previously has been reached. The annual slaughter of cattle and calves from this higher level of stocking thus might be expected to be around 30 million head--19 million head of cattle and 11 million head of calves.

Feed for Many Hogs.- Allowing time for adjustments, the production of hogs is closely related to the available supplies of feed concentrates, especially corn.

The analysis here made of the postwar situation for feed grains indicates a production of 110 million tons as a likely minimum. This estimate assumes that after the war farmers will adjust their cropping systems in the direction of restoring and maintaining the productivity of the soil, and that yields per acre of the feed grains will not exceed the current level in normal weather.

The analysis also indicates a much higher potential production. Some further advancement in yields seems almost certain from wider use of new improved varieties of seed and from increased use of fertilizer and better tillage machinery, particularly if the conversion from war to peace is carried out in a way that will maintain a reasonably high level of employment and national income. Moreover, farmers may hesitate to go all the way in making the downward adjustments in the acreage of corn considered to be a part of any program for restoring and maintaining the soil. In either case production of feed grains would be above the likely minimum of 110 million tons. Full attainment of the estimated possibilities for increases in yields in a prosperous agriculture would not permit continuation of wartime acreages of corn, but it could raise total production of feed grains on a smaller total acreage to 127 million tons--almost 8 million tons above average wartime production.

What do the prospective supplies of feed grains mean when translated into production of hogs? Assuming the lower figure of 110 million tons of feed grains, and making allowances for additions of byproducts, wheat, and rye, and for withdrawals for seed, food, and industry, the prospective supply of concentrates available for feeding all classes of livestock and poultry would be approximately 118 million tons. Assuming further that about 35 percent of the available supply of concentrates (the usual proportion) would be fed to hogs, and allowing 1,000 pounds per hog, the annual production of hogs for slaughter would be about 82 million head. But, if production of feed grains should reach the potential here indicated, and if the same allowances are made, the calculated production of hogs is 94 million head. These numbers can be compared with an average slaughter of 57 million head in 1935-39 and the wartime record of 97 million head in 1944.

Market Outlets.- After pent-up demands of domestic consumers and foreign relief requirements have been met, satisfactory markets and prices for meat and other agricultural commodities can best be assured by a high level of domestic employment and national income. Otherwise, farmers may find that they have greater supplies of many products, including meat animals, than can be sold at satisfactory prices. The total number of dollars slaughterers pay for cattle (including calves) and hogs for domestic use is especially closely related to national income.

No one can now predict what the postwar national income will be, say in 1950. In the middle 1920's the national income was 80 billion dollars. By 1950 the population of the United States is expected to be about 23 percent larger than it was in 1926. Hence, assuming about the same general price level, a national income of about 100 billion dollars in 1950 would be comparable with 80 billion dollars in the middle 1920's. Taking the possibility of a higher price level into account, it would seem that somewhere within the range of from 105 to 150 billion dollars might be a conservative estimate of the national income in 1950. If there is considerable unemployment, the national income might be as low as 105 billion dollars. But if conversion from war to peace is managed in such a way as to maintain full employment, a national income of 150 billion dollars or higher has been estimated by several analysts. 3/

3/ For example, see What Peace can Mean to American Farmers, Misc. Pub. 562, U. S. Department of Agriculture. May 1945.

Based upon an analysis of past relationships farmers can expect receipts of about 1,550 million dollars from the sale of cattle and about 1,350 million dollars from the sale of hogs for domestic use as meat, if the national income is 105 billion dollars. Corresponding estimates of receipts in a situation in which the national income is 150 billion dollars are about 1,925 million dollars from the sale of cattle and 1,955 million dollars from the sale of hogs for domestic use. In those years since 1921 when relatively large numbers of cattle and calves were marketed for slaughter--as from 1923 to 1926 and in 1943--they sold for about the same total number of dollars as the hogs that were sold for domestic use. In other years the total dollar sales of cattle and calves were larger than were those of hogs.

The number of cattle and hogs for which farmers may expect to find a domestic outlet for slaughter depends not only upon the size of the national income, but also on the sale price. If, in addition to the above relationships between a national income of 105 billion dollars and the total receipts from cattle and hogs, average farm prices per hundredweight of $8 for cattle, $9.75 for veal calves, and $9.10 for hogs are assumed, farmers could expect to find a market for slaughter for domestic use for about 27 million head of cattle and calves and 62 million head of hogs.

If, on the other hand, the national income is 150 billion dollars, and average farm prices per hundredweight of $10.25 for cattle, $12.00 for veal calves, and $11.25 for hogs are assumed, farmers could expect to find a market for slaughter for domestic use for about 28.4 million head of cattle and calves and 74 million head of hogs. To these numbers marketed for domestic use for meat there would be added about 1.2 million head of cattle and calves and 13 million head of hogs for slaughter on farms.

Thus under the conditions here assumed farmers could expect to find a domestic outlet for slaughter for 28 to 30 million head of cattle and calves and for 75 to 87 million head of hogs, depending upon the size of the national income. These estimates compare with an average slaughter of about 25 million head of cattle and calves, and 55 million head of hogs for domestic use in the prewar years 1935-39.

Pork and lard were the only meat-animal products for which the United States had any appreciable export outlet before the war. From 1935 to 1939 our exports of pork averaged about 2 percent and of lard about 12 percent of the annual production. The prospects for an expansion of exports of these products in the longer-term postwar period are not very bright. Denmark and other European hog-producing countries came out of the war with reduced breeding stock--probably 30 to 40 percent below prewar--but when they can obtain their usual supplies of feed they will soon get back to normal production. Canada has greatly expanded hog production during the war and hopes to continue to find an outlet for any surplus in Great Britain. Argentina, too, will be seeking a market in other countries for a part of its small, but increasing,production. A recent analysis of the postwar situation regarding exports of farm products from the United States indicates that exports of 600 million pounds of lard and 340 million pounds of pork (about the same as in 1925-29), which would be equivalent to 5 to 6 million head of hogs, is as high as can be reasonably expected even under full employment. 4/

Summary and Conclusions

On the production side, increasing the supplies of feed for producing meat and dairy and poultry products is progressive and will persist where it is done by shifting from horse to mechanical power, by the use of hybrid corn and other new higher-yielding varieties of seed, by turning from grass to higher-yielding legume hays and pastures, and by increasing the use of fertilizer. Likewise an influence in the direction of a larger production of livestock will be the feeding of better-balanced rations resulting from continuation of larger than prewar acreages of crops yielding protein meals as a byproduct. Renewed practice of soil conservation after the war may mean some reduction in grains for hogs, but increased forage supplies for cattle and sheep--with little or no reduction in total feed units. On the other hand, prolonged continuation of the better-than-average growing weather for ranges, farm pastures, and feed crops is unpredictable but is highly uncertain. Even so, the over-all situation for the next several years appears to be that farmers in the United States will be able to grow enough feed for producing a large volume of meat.

The analysis here made of postwar production prospects for feed crops indicates that farmers are likely to plant at least 88-89 million acres of corn, 45 million acres of oats, 15 million acres of barley, and to harvest 8.5 million acres of sorghums for grain. If these acreages of the four feed grains are either planted or harvested, the total tonnage of feed grains produced might be expected to range from 11 million tons more than the average production in 1937-41 (8.5 million tons less than in 1942-44) to as much as 8 million tons more than the average wartime production in 1942-44, depending upon the extent of further increases in the yields per acre of the feed grains resulting from wider use of approved production practices. In a prosperous agriculture it would pay farmers to use approved practices which might be expected to lift acre yields of corn and oats above current normal expectancy by as much as 20 percent.

The prospective production of feed crops would provide feed for supporting high levels of production of meat animals. The yearly numbers of animals available for slaughter from the indicated levels of production is calculated as about 30 million head of cattle and calves, 22 million head of sheep and lambs, and 82-94 million head of hogs. The range in the number of hogs for slaughter corresponds to the range in the available supply of feed grains mentioned above.

4/ See What Peace Can Mean to American Farmers, Misc. Pub. 562, U. S. Department of Agriculture, May 1945.

Assuming a total population in 1950 of 144 millions and a slaughter of 30 million head of cattle and calves, the per capita production of beef and veal would be about 70 pounds, which would be about the same as the per capita consumption in the middle 1920's and the per capita civilian consumption in 1941 and 1942. The per capita production of pork and lard from a slaughter of 82 million hogs would be about 91 pounds; from 94 million hogs, about 104 pounds. A per capita production of 91 pounds of pork and lard (no allowance for exports) would be about 9 pounds more than the average per capita consumption in 1920-29, whereas a production of 104 pounds per capita would be about 22 pounds more than the average per capita consumption in 1920-29, and almost 13 pounds more than the average per capita civilian consumption in 1944.

Satisfactory markets and prices for meat and other agricultural commodities can best be assured by a high level of domestic employment and national income. The total number of dollars that slaughterers pay for meat animals for domestic use is related especially closely to national income. Calculations based upon an analysis of past relationships indicate that if the national income in the postwar period is as low as 105 billion, farmers could expect to find a domestic slaughter outlet at commensurate prices for about 28 million head of cattle and calves and for 75 million head of hogs. On the other hand, if conversion from war to peace is so carried out that national income is maintained at a high level (150 billion dollars), farmers could expect to find a domestic slaughter outlet at commensurate prices for about 30 million head of cattle and calves and 87 million head of hogs. A postwar export outlet for pork and lard equivalent to 5 to 6 million head of hogs (about the same as the average from 1925 to 1929) is as high a level as can be reasonably expected even under full employment.

A production of 94 million hogs is about the same as the estimated number for which farmers could expect to find domestic and foreign outlets, assuming the domestic market would be supported by a national income as high as 150 billion dollars. On the other hand, a production of 82 million hogs is 7 million head more than domestic consumers would probably take at a price commensurate with a national income of 105 billion dollars. Obviously corn-hog farmers have a big stake in full employment and a high national income, and in maintaining export outlets at least as large as they had before the war. Otherwise both surpluses of either corn or pork products and low prices almost certainly will confront them in the postwar period.

The cattle-raising industry is always in a vulnerable position when cattle numbers are at the top of the cycle. In view of the current wartime demand for all meats, conditions now are unusually favorable for cattlemen to adjust numbers to safe carrying capacity by marketing large numbers for slaughter. These adjustments will be more difficult to make if demand for meat should decrease or the feed situation become acute on the range. But cattlemen should not become panicky when making the adjustments. The longer-time outlook for the cattle enterprise is comparatively favorable. When the post-conversion stage is reached there will again be enough feed to put a high finish on a large number of cattle in feedlots. If the level of employment in the postwar years is reasonably high, the demand for beef of good quality will provide a market for the product of a very large acreage of grazing land and cropland.

The wool situation is the uncertain element in the sheep industry during the next few years. It may cause some further liquidation of sheep. In general, however, sheepmen already have gone most of the way toward, and in some areas below, an adjustment to the safe limits of range and forage. The total number of stock sheep on ranges and farms on January 1, 1945 was the smallest since 1929, and was far too small to produce the per capita supplies of lamb and mutton that were normally consumed in the prewar years. The outlook during the next five years for prices is more favorable for lambs than for either cattle or hogs.

Briefly, the conclusion is that there are several progressive influences in the direction of larger supplies and better quality feed, which in turn will encourage a relatively high production of meat animals. If we have prosperity, the prospects for market outlets for such animals at prices reasonably satisfactory to farmers are fairly good. But if consumers do not have a generous measure of purchasing power for buying meats of good quality, then the producers of feed crops and meat animals, along with those who emphasize the production of other products, will have difficulty in making the adjustments. The problem would be: How can the potential output of feed grains, hay, and pastures, and of meat, and dairy and poultry products, be so utilized or controlled that its magnitude will not demoralize the whole structure of livestock prices? As between the alternatives of controls on production and expanded utilization, efforts in the direction of maintaining broad outlets for the potential production of livestock products in systems of well-balanced farming promise to be more advantageous in the long run to both farmers and all other groups in the economy.

Efforts in the past to restrict production or marketings of basic commodities and thereby to maintain or raise prices of those commodities have encountered accumulative difficulties. Either or both of two things happen: farmers must shift their resources to less efficient uses or stocks grow into unmanageable proportions. Changes from one product to another, or to less efficient methods of production, may alleviate the pressure on prices of particular products, but they cannot support farm incomes in depression years.

Other methods would be needed to cope with shrinking market outlets for meat. Providing food enough for health to those with inadequate incomes would enlarge the outlets for meat, but much less than for other staple foods. Stimulation of foreign exports for pork and lard offers hopeful, but undoubtedly limited, possibilities. Aiding farmers in the improvement of production and marketing practices in order that they might share the benefits with consumers would somewhat improve the balance between demand and supplies. But all of these measures combined cannot be nearly so effective as full employment throughout the national economy and a large volume of international trade in maintaining large market outlets for the potential production of feed grains and meat.